



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

Harvard University
Library of
The Medical School
and
The School of Public Health



The Gift of
Dr. J.G. Greenfield

Shelf 23 -



8136

2-50

MEDICO-CHIRURGICAL TRANSACTIONS.

PUBLISHED BY

THE ROYAL
MEDICAL AND CHIRURGICAL SOCIETY
OF
LONDON.

VOLUME THE FIFTY-FIFTH.

LONDON :
LONGMANS, GREEN, READER, AND DYER,
PATERNOSTER ROW.

1872.

HARVARD UNIVERSITY
SCHOOL OF MEDICINE AND PUBLIC HEALTH
LIBRARY

29 NOV 1935

Gift: Dr. J. G. Greenfield

R. G. B. 1937.1

MEDICO-CHIRURGICAL TRANSACTIONS.

PUBLISHED BY

THE ROYAL
MEDICAL AND CHIRURGICAL SOCIETY
OF
LONDON.

SECOND SERIES.

VOLUME THE THIRTY-SEVENTH.



LONDON:
LONGMANS, GREEN, READER, AND DYER,
PATERNOSTER ROW.

1872.

PRINTED BY J. E. ADLARD, BARTHOLOMEW CLOSE.

ROYAL
MEDICAL AND CHIRURGICAL SOCIETY
OF LONDON.

PATRON.
THE QUEEN.

OFFICERS AND COUNCIL,
ELECTED MARCH 1, 1872.

President.

THOMAS BLIZARD CURLING, F.R.S.

VICE-PRESIDENTS.	{	ALEXANDER PATRICK STEWART, M.D.
		ANDREW WHYTE BARCLAY, M.D.
		GEORGE CRITCHETT.
		JOHN ABERNETHY KINGDON.
TREASURERS.	{	THOMAS GRAHAM BALFOUR, M.D., F.R.S.
		JOHN BIRKETT.
SECRETARIES.	{	EDMUND SYMES THOMPSON, M.D.
		THOMAS SMITH.
LIBRARIANS.	{	THOMAS KING CHAMBERS, M.D.
		CHARLES BROOKE, M.A., F.R.S.
OTHER MEMBERS OF COUNCIL.	{	EDWARD BALLARD, M.D.
		ROBERT GREENHALGH, M.D.
		GEORGE HARLEY, M.D., F.R.S.
		HUGH JAMES SANDERSON, M.D.
		WALTER HAYLE WALSH, M.D.
		WILLIAM OLIVER CHALK.
		GEORGE GREEN GASCOYEN.
		JOHN WHITAKER HULKE, F.R.S.
		EDWIN SAUNDERS.
		WILLIAM SCOVELL SAVORY, F.R.S.

THE ABOVE FORM THE COUNCIL.

TRUSTEES OF THE
SOCIETY. { GEORGE BURROWS, M.D., F.R.S.
CÆSAR HENRY HAWKINS, F.R.S.

RESIDENT ASSISTANT-LIBRARIAN.
BENJAMIN ROBERT WHEATLEY.

**FELLOWS OF THE SOCIETY APPOINTED BY
THE COUNCIL AS REFEREES OF PAPERS,
FOR THE SESSION OF 1872-73.**

BARNES, ROBERT, M.D.
BARWELL, RICHARD.
CALLENDER, GEORGE WILLIAM, F.R.S.
CLARK, FREDERICK LE GROS, F.R.S.
DICKINSON, WILLIAM HOWSHIP, M.D.
FERGUSON, SIR WILLIAM, BART., F.R.S.
FORSTER, JOHN COOPER.
FOX, WILSON, M.D., F.R.S.
GREENHOW, EDWARD HEADLAM, M.D., F.R.S.
HABERSHON, SAMUEL OSBORNE, M.D.
HARLEY, JOHN, M.D.
HAWKINS, CÆSAR HENRY, F.R.S.
HEWETT, PRESCOTT GARDNER.
HEWITT, GRAILY, M.D.
HOLMES, TIMOTHY.
HOLTHOUSE, CARSTEN.
MARSHALL, JOHN, F.R.S.
OGLE, JOHN WILLIAM, M.D.
OLDHAM, HENRY, M.D.
PAGET, SIR JAMES, D.C.L., F.R.S.
PAVY, FREDERICK WILLIAM, M.D., F.R.S.
POLLOCK, JAMES E., M.D.
POWER, HENRY.
PRIESTLEY, WILLIAM OVEREND, M.D.
RADCLIFFE, CHARLES BLAND, M.D.
REES, GEORGE OWEN, M.D., F.R.S.
SIBSON, FRANCIS, M.D., F.R.S.
SIEVEKING, EDWARD HENRY, M.D.
SIMON, JOHN, D.C.L., F.R.S.
SMITH, SPENCER.
WEBER, HERMANN, M.D.
WEST, CHARLES, M.D.
WILKS, SAMUEL, M.D., F.R.S.
WOOD, JOHN, F.R.S.

A LIST OF THE PRESIDENTS OF THE SOCIETY
FROM ITS FORMATION.

ELECTED

- 1805. WILLIAM SAUNDERS, M.D.
- 1808. MATTHEW BAILLIE, M.D.
- 1810. SIR HENRY HALFORD, BART., M.D., G.C.H.
- 1813. SIR GILBERT BLANE, BART., M.D.
- 1815. HENRY CLINE.
- 1817. WILLIAM BABINGTON, M.D.
- 1819. SIR ASTLEY PASTON COOPER, BART., K.C.H., D.C.L.
- 1821. JOHN COOKE, M.D.
- 1823. JOHN ABERNETHY.
- 1825. GEORGE BIRKBECK, M.D.
- 1827. BENJAMIN TRAVERS.
- 1829. PETER MARK ROGET, M.D.
- 1831. SIR WILLIAM LAWRENCE, BART.
- 1833. JOHN ELLIOTSON, M.D.
- 1835. HENRY EARLE.
- 1837. RICHARD BRIGHT, M.D., D.C.L.
- 1839. SIR BENJAMIN COLLINS BRODIE, BART., D.C.L.
- 1841. ROBERT WILLIAMS, M.D.
- 1843. EDWARD STANLEY.
- 1845. WILLIAM FREDERICK CHAMBERS, M.D., K.C.H.
- 1847. JAMES MONCRIEFF ARNOTT.
- 1849. THOMAS ADDISON, M.D.
- 1851. JOSEPH HODGSON.
- 1853. JAMES COPLAND, M.D.
- 1855. CÆSAR HENRY HAWKINS.
- 1857. SIR CHARLES LOCOCK, BART., M.D.
- 1859. FREDERIC CARPENTER SKEY.
- 1861. BENJAMIN GUY BABINGTON, M.D.
- 1863. RICHARD PARTRIDGE.
- 1865. SIR JAMES ALDERSON, M.D.
- 1867. SAMUEL SOLLY.
- 1869. GEORGE BURROWS, M.D.
- 1871. THOMAS BLIZARD CURLING.

FELLOWS

OF THE

ROYAL MEDICAL AND CHIRURGICAL SOCIETY

OF LONDON.

EXPLANATION OF THE ABBREVIATIONS.

P.—President.

V.P.—Vice-President.

T.—Treasurer.

S.—Secretary.

L.—Librarian.

C.—Member of Council.

The figures succeeding the words *Trans.* and *Pro.* show the number of Papers which have been contributed to the Transactions or Proceedings by the Fellow to whose name they are annexed. *Sci. Com.* is attached to the names of those who have served on the Scientific Committees of the Society.

OCTOBER, 1872.

Those marked thus (†) have paid the Composition Fee in lieu of further annual subscriptions.

Amongst the non-residents those marked thus (*) are entitled by composition to receive the Transactions.

Elected

- 1846 *ABERCROMBIE, JOHN, M.D., Physician to the Cheltenham General Hospital; 13, Suffolk-square, Cheltenham.
- 1851 *ACLAND, HENRY WENTWORTH, M.D., F.R.S., Honorary Physician to H.R.H. the Prince of Wales; Physician to the Radcliffe Infirmary; Regius Professor of Medicine, and Clinical Professor in the University of Oxford.
- 1847 ACOSTA, ELISHA, M.D., 24, Rue de Luxembourg, St. Honoré, Paris.
- 1842 ACTON, WILLIAM, 17, Queen Anne Street, Cavendish square.
Trans. 1.

Elected

- 1852 ADAMS, WILLIAM, 5, Henrietta street, Cavendish square,
Trans. 2.
- 1867 AIKIN, CHARLES ARTHUR, 7, Clifton place, Hyde park.
- 1837 *AINSWORTH, RALPH FAWSETT, M.D., Consulting Physician
to the Manchester Royal Infirmary; Cliff Point, Lower
Broughton, Manchester.
- 1839 ALCOCK, SIR RUTHERFORD, K.C.B., K.C.T., K.T.S., D.C.L.,
H.M.'s Envoy Extraordinary at the Court of Pekin.
Trans. 1.
- 1866 ALLBUTT, THOMAS CLIFFORD, M.A. and M.D., F.L.S.,
Lecturer on the Practice of Physic at the Leeds School
of Medicine, and Physician to the Leeds General Infir-
mary; 38, Park square, Leeds. *Trans.* 3.
- 1869 ALLEN, PETER, M.D., Aural Surgeon to St. Mary's Hos-
pital; 117, Harley street, Cavendish square.
- 1863 ALTHAUS, JULIUS, M.D., Physician to the Infirmary for
Epilepsy and Paralysis; 18, Bryanston street, Portman
square. *Trans.* 2.
- 1862 ANDREW, EDWYN, M.D., Hardwick House, St. John's Hill,
Shrewsbury.
- 1862 ANDREW, JAMES, M.D., Physician to, and Lecturer on
Medicine at, St. Bartholomew's Hospital; 22, Harley
street, Cavendish square.
- 1820 ANDREWS, THOMAS, M.D., Norfolk, Virginia.
- 1867 ANSTIE, FRANCIS EDMUND, M.D., Senior Assistant-Physician
to, and Lecturer on Medicine at, the Westminster Hos-
pital; 16, Wimpole street, Cavendish square.
- 1870 ARNOTT, HENRY, Assistant-Surgeon to St. Thomas's Hospital;
6, Nottingham place, Marylebone road.
- 1819 †ARNOTT, JAMES MONCRIEFF, F.R.S., Chapel House, Lady
Bank, Fifeshire. L. 1826-8. V.P. 1832-3. T. 1835-40.
C. 1846, 1855-6. P. 1847-8. *Trans.* 8.
- 1817 †ASHBURNER, JOHN, M.D., F.L.S., 161A, Piccadilly. C.
1821, 1830-31.
- 1851 ASHTON, THOMAS JOHN, Consulting Surgeon to the St.
Marylebone Infirmary; 31, Cavendish square.

Elected

- 1836 BAIRD, ANDREW WOOD, M.D., Physician to the Dover Hospital ; 7, Camden crescent, Dover, Kent.
- 1851 *BAKER, ALFRED, Surgeon to the Birmingham General Hospital ; 20A, Temple row, Birmingham.
- 1865 BAKER, WILLIAM MORRANT, Assistant Surgeon to, and Lecturer on Anatomy and Physiology, and Warden of the College at, St. Bartholomew's Hospital. *Trans.* 2.
- 1869 BAKEWELL, ROBERT HALL, M.D., Medical Superintendent of the Smallpox Hospital, Port of Spain, Trinidad.
- 1839 †BALFOUR, THOMAS GRAHAM, M.D., F.R.S., *Treasurer*, Deputy Inspector-General of Hospitals ; 6, Whitehall yard. C. 1852-3. V.P. 1860-1. T. 1872. *Trans.* 2.
- 1848 BALLARD, EDWARD, M.D., Inspector under the Privy Council ; 7, Compton terrace, Islington. C. 1872. *Trans.* 5.
- 1849 BALLARD, THOMAS, M.D., 10, Southwick place, Hyde park square.
- 1866 *BANKS, JOHN THOMAS, M.D., Physician to Richmond, Whitworth, and Hardwicke Hospitals ; Consulting Physician to the Coombe Hospital ; 10, Merrion square east, Dublin.
- 1847 BARCLAY, ANDREW WHYTE, M.D., *Vice-President*, Physician to, and Lecturer on Medicine at, St. George's Hospital ; Medical Officer of Health for Chelsea ; 23A, Bruton street, Berkeley square. S. 1857-60. L. 1861-2. C. 1865-6. V.P. 1872. *Trans.* 2.
- 1862 BARKER, EDGAR, jun., 21, Hyde park street.
- 1833 †BARKER, THOMAS ALFRED, M.D., Consulting Physician to St. Thomas's Hospital ; 27, Wimpole street. C. 1844-5. V.P. 1853-4. T. 1860-2. *Trans.* 6.
- 1861 BARNES, ROBERT, M.D., Obstetric Physician to, and Lecturer on Midwifery at, St. Thomas's Hospital ; Examiner in Midwifery at the University of London ; 31, Grosvenor street. *Trans.* 4.
- 1864 BARRATT, JOSEPH GILLMAN, M.D., 8, Cleveland gardens, Bayswater.

Elected

- 1840 BARROW, BENJAMIN, Surgeon to the Royal Isle of Wight Infirmary; Southlands, Ryde, Isle of Wight.
- 1859 BARWELL, RICHARD, Surgeon to, and Lecturer on Anatomy and Clinical Surgery at, the Charing Cross Hospital; 32, George street, Hanover square. *Trans.* 1.
- 1844 BASHAM, WILLIAM RICHARD, M.D., Senior Physician to the Westminster Hospital; 17, Chester street, Belgrave square. S. 1852-4. C. 1860-1. V.P. 1864-5. T. 1871. *Trans.* 2.
- 1868 BASTIAN, HENRY CHARLTON, M.A., M.D., F.R.S., Professor of Pathological Anatomy in University College, London, and Physician to University College Hospital; 20, Queen Anne street, Cavendish square. *Trans.* 1.
- 1862 BEALE, LIONEL SMITH, M.B., F.R.S., Professor of Pathological Anatomy in King's College, London, and Physician to King's College Hospital; 61, Grosvenor street. *Trans.* 1.
- 1860 *BEALEY, ADAM, M.D., M.A., Camb., Oak Lea, Harrogate.
- 1841 BEAMAN, GEORGE, M.D., 3, Henrietta street, Covent garden.
- 1856 BEARDSLEY, AMOS, F.L.S., Bay villa, Grange-over-Sands, Lancashire.
- 1865 BEATTIE, HENRY, M.D., 5, Albert square, Commercial road east.
- 1836 BEAUMONT, WILLIAM RAWLINGS, Consulting Surgeon to the Toronto General Hospital; Toronto, Canada West. *Trans.* 8.
- 1871 BECK, MARCUS, M.S., Surgical Registrar and Teacher of Practical Surgery to the University College Hospital; 30, Wimpole street, Cavendish square.
- 1858 BEGLEY, WILLIAM CHAPMAN, M.D., Middlesex County Lunatic Asylum, Hanwell.
- 1819 †BELL, THOMAS, F.R.S., F.L.S., The Wakes, Selborne, Hants. C. 1832-3. V.P. 1854. *Trans.* 1.

Elected

- 1871 **BELLAMY, EDWARD**, Assistant-Surgeon, Charing Cross Hospital, and Surgeon to the St. George's and St. James's Dispensary; 59, Margaret street, Cavendish square.
- 1847 **BENNET, JAMES HENRY, M.D.**, The Ferns, Weybridge, and Mentone.
- 1845 **BERRY, EDWARD UNWIN**, 76, Gower street, Bedford square.
- 1820 **BERTIN, STEPHEN**, Paris.
- 1872 **BEVERLEY, MICHAEL, M.D.**, 63, St. Giles's street, Norwich.
- 1865 ***BICKERSTETH, EDWARD ROBERT**, Surgeon to the Liverpool Royal Infirmary, and Lecturer on Clinical Surgery in the Liverpool Royal Infirmary School of Medicine; 2, Rodney street, Liverpool.
- 1815 **†BILLING, ARCHIBALD, M.D., F.R.S.**, Member of the Senate of the University of London; 34, Park lane. C. 1825. V.P. 1828-9.
- 1854 **BIRD, PETER HINCKES, F.L.S.**, 1, Norfolk square, Hyde park.
- 1856 **BIRD, WILLIAM**, Bute House, Hammersmith.
- 1849 **BIRKETT, EDMUND LLOYD, M.D.**, Physician to the City of London Hospital for Diseases of the Chest; 48, Russell square. C. 1865-6.
- 1851 **BIRKETT, JOHN, F.L.S.**, *Treasurer*, Surgeon to, and Lecturer on Surgery at, Guy's Hospital; Examiner in Surgery at the University of London; 59, Green Street, Grosvenor square. L. 1856-7. S. 1863-5. C. 1867-8. T. 1870-72. *Trans.* 8. *Sci. Com.*
- 1866 **BISHOP, EDWARD, M.D.**, Cintra park, Upper Norwood.
- 1843 **BLACK, PATRICK, M.D.**, Physician to, and Lecturer on Medicine at, St. Bartholomew's Hospital; 11, Queen Anne street, Cavendish square, C. 1856. V.P. 1866. T. 1869-70.
- 1840 **BLAKISTON, PEYTON, M.D., F.R.S.**, St. Leonard's-on-Sea.
- 1865 **BLANCHET, HILARION**, Examiner to the College of Physicians and Surgeons, Lower Canada; 6, Palace street, Quebec, Canada east.

Elected

- 1865 BLANDFORD, GEORGE FIELDING, M.D., Lecturer on Psychological Medicine at St. George's Hospital; 71, Grosvenor street.
- 1867 BLOXAM, JOHN ASTLEY, Surgical Registrar to St. Bartholomew's Hospital; Junior Surgeon to the West London Hospital; 8, George street, Hanover square.
- 1823 BOJANUS, LOUIS HENRY, M.D., Wilna.
- 1846 BOSTOCK, JOHN ASHTON, C.B., Hon. Surgeon to H.M. the Queen; Surgeon-Major, Scots Fusilier Guards; 54 Chester square, Belgravia. C. 1861-2. V.P. 1870-71. *Sci. Com.*
- 1869 BOURNE, WALTER, M.D., care of the National Bank of India, 80, King William street, City.
- 1870 *BOWLES, ROBERT LEAMON, M.D., 8, West terrace, Folkestone.
- 1841 †BOWMAN, WILLIAM, F.R.S., F.L.S., Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 5, Clifford street, Bond street. C. 1852-3. V.P. 1362. *Trans.* 3.
- 1862 BRACE, WILLIAM HENRY, M.D., 7, Queen's Gate terrace, Kensington.
- 1867 *BRETT, ALFRED T., M.D., Watford, Herts.
- 1867 BRIDGEWATER, THOMAS, M.B. Lond., Harrow-on-the-Hill, Middlesex.
- 1868 BROADBENT, WILLIAM HENRY, M.D., Physician to, and Joint Lecturer on Medicine at, St. Mary's Hospital; Physician to the London Fever Hospital; 34, Seymour street, Portman square. *Trans.* 1.
- 1851 BRODHURST, BERNARD EDWARD, F.L.S., Surgeon to the Orthopædic Department of, and Lecturer on Orthopædic Surgery at, St. George's Hospital, and Surgeon to the Royal Orthopædic Hospital; 20, Grosvenor street. C. 1868-9. *Trans.* 2. *Pro.* 1.
- 1844 †BROOKE, CHARLES, M.A., F.R.S., *Librarian*, Consulting Surgeon to the Westminster Hospital; 16, Fitzroy square. C. 1855. L. 1866-72.

Elected

- 1857 *BROWN, ROBERT, Surgeon to the Cumberland Infirmary ;
5, Devonshire street, Caslisle.
- 1860 BROWN-SEQUARD, CHARLES EDOUARD, M.D., F.R.S., late
Professor of Physiology and Pathology, Massachusetts
Medical College, Harvard University, Boston, U.S.;
Rue Gay-Lussac, 28, Paris. *Sci. Com.*
- 1867 BRUNJES, MARTIN, 42, Brook street, Grosvenor square.
- 1871 BRUNTON, THOMAS LAUDER, M.D., Casualty Physician to
St. Bartholomew's Hospital; 23, Somerset street, Port-
man square.
- 1860 BRYANT, THOMAS, Surgeon to Guy's Hospital; 2, Finsbury
square. *Trans.* 8; *Pro.* 1. *Sci. Com.*
- 1855 BRYANT, WALTER JOHN, L.R.C.P. Edinb.; 23A, Sussex
square, Hyde park gardens.
- 1823 BUCHANAN, B. BARTLET, M.D.
- 1864 BUCHANAN, GEORGE, M.D., Medical Inspector for the Privy
Council; 24, Nottingham place, Marylebone road.
- 1864 BUCKLE, FLEETWOOD, M.D. (late at Royal Naval Hospital,
Haslar; Gosport, Hants).
- 1839 BUDD, GEORGE, M.D., F.R.S., Consulting Physician to the
Seamen's Hospital, Greenwich; Ashleigh, Barnstaple.
C. 1846-7. V.P. 1857. *Trans.* 5.
- 1833 †BURROWS, GEORGE, M.D., F.R.S., President of the Royal
College of Physicians; Physician Extraordinary to
H.M. the Queen; Consulting Physician to St. Bartho-
lomew's Hospital; Physician to Christ's Hospital;
Member of the Senate of the University of London; 18,
Cavendish square. C. 1839-40, 1858-9. T. 1845-7.
V.P. 1849-50. P. 1869-70. *Trans.* 2.
- 1837 †BUSK, GEORGE, F.R.S., F.L.S., Consulting Surgeon to the
Seamen's Hospital, Greenwich; 32, Harley street,
Cavendish square. C. 1847-8. V.P. 1855. T. 1866.
Trans. 4.
- 1871 BUTT, WILLIAM F., 12, South street, Park lane.

Elected

- 1818 BUTTER, JOHN, M.D., F.R.S., F.L.S., Physician Extraordinary to the Plymouth Royal Eye Infirmary; Windsor villa, Plymouth.
- 1868 BUZZARD, THOMAS, M.D., Physician to the National Hospital for the Paralysed and Epileptic; 56, Grosvenor street, Grosvenor square.
- 1851 *CADGE, WILLIAM, Surgeon to the Norfolk and Norwich Hospital; 24, St. Giles's street, Norwich. *Trans.* 1.
- 1861 CALLENDER, GEORGE WILLIAM, F.R.S., Surgeon to, and Lecturer on Surgical Anatomy at, St. Bartholomew's Hospital; 47, Queen Anne street, Cavendish square. *Trans.* 3. *Sci. Com.*
- 1852 *CANNEY, GEORGE, M.D., Bishop-Auckland, Darlington, Durham.
- 1847 CARLILL, JOHN BURFORD, M.D., 42, Weymouth street, Portland place.
- 1853 CARTER, ROBERT BRUDENELL, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. George's Hospital; Surgeon to the Royal South London Ophthalmic Hospital; 69, Wimpole street, Cavendish square, W.
- 1845 CARTWRIGHT, SAMUEL, Professor of Dental Surgery at King's College, London; Surgeon-Dentist to King's College Hospital; Consulting Surgeon to the Dental Hospital; 32, Old Burlington street. *C.* 1860-1. *Sci. Com.*
- 1868 CAVAFY, JOHN, M.B. Lond., Medical Registrar and Lecturer on Physiological Histology at St. George's Hospital; 13, Arlington street, Piccadilly.
- 1871 CAYLEY, WILLIAM, M.D., Assistant Physician to, and Lecturer on Pathological Anatomy at, the Middlesex Hospital; Physician to the London Fever Hospital; 58, Welbeck street, Cavendish square.
- 1845 CHALK, WILLIAM OLIVER, 3, Nottingham terrace, York gate, Regent's park. *C.* 1872.

Elected

- 1844 CHAMBERS, THOMAS KING, M.D., *Librarian*, Hon. Physician to H.R.H. the Prince of Wales; Consulting Physician to, and Lecturer on Medicine at, St. Mary's Hospital; Consulting Physician to the Lock Hospital; 64, Brook street, Grosvenor square. C. 1861. V.P. 1867. L. 1869-72. *Trans.* 1.
- 1859 CHANGE, FRANK, M.D., Croft Lodge, Cambridge.
- 1849 CHAPMAN, FREDERICK, Old Friars, Richmond Green, Surrey.
- 1837 †CHAPMAN, HENRY THOMAS, 21, Lower Seymour street, Portman square. C. 1858.
- 1868 CHEADLE, WALTER BUTLER, M.D., Assistant-Physician to, and Lecturer on Pathology at, St. Mary's Hospital; Assistant-Physician to the Hospital for Sick Children; 2, Hyde park place, Cumberland gate.
- 1865 CHOLMELEY, WILLIAM, M.D., Physician to the Great Northern Hospital, and to the Margaret Street Infirmary for Consumption; 63, Grosvenor street, Grosvenor square.
- 1872 CHRISTIE, THOMAS B., M.D., Medical Superintendent, Royal Indian Asylum, Ealing.
- 1866 CHURCH, WILLIAM SELBY, M.D., Assistant-Physician to, and Lecturer on Comparative Anatomy at, St. Bartholomew's Hospital; 2, Upper George street, Bryanston square.
- 1860 CLARK, ANDREW, M.D., Physician to, and Lecturer on Medicine at, the London Hospital; 16, Cavendish square.
- 1839 †CLARK, FREDERICK LE GROS, F.R.S., Surgeon to, and Lecturer on Surgery at, St. Thomas's Hospital; 14, St. Thomas's street, Southwark, and Lee, Kent. S. 1847-9. V.P. 1855-6. *Trans.* 4.
- 1848 CLARKE, JOHN, M.D., Obstetric Physician to, and Lecturer on Midwifery at, St. George's Hospital; Physician to the General Lying-in Hospital; 42, Hertford street, Mayfair. C. 1866.

Elected

- 1866 CLARKE, WILLIAM FAIRLIE, M.A. (Oxon.), Assistant-Surgeon to the Charing Cross Hospital, and to the Central London Ophthalmic Hospital; 12, Mansfield street, Cavendish square. *Trans.* 1.
- 1861 *CLARKE, WILLIAM JAMES, Surgeon to the Huddersfield Infirmary; John-William street, Huddersfield, Yorkshire.
- 1850 CLARKSON, JOSIAH, New Hall street, Birmingham. *Trans.* 1.
- 1842 CLAYTON, OSCAR MOORE PASSEY, Extra Surgeon-in-Ordinary to H.R.H. the Prince of Wales, and Surgeon-in-Ordinary to H.R.H. the Duke of Edinburgh; 5, Harley street, Cavendish square. C. 1865.
- 1853 CLOVER, JOSEPH THOMAS, 3, Cavendish place, Cavendish square.
- 1857 COATES, CHARLES, F.R.C.P. Edinb., Physician to the Bath United General Hospital; 10, Circus, Bath.
- 1868 COCKLE, JOHN, M.D., F.L.S., Physician to the Royal Free Hospital; 7, Suffolk place, Pall mall. *Trans.* 2.
- 1850 COHEN, DANIEL WHITAKER, M.D., South Bank, North Down lane, Bideford, Devon.
- 1818 COLE, ROBERT, F.L.S., Holybourne, Hampshire.
- 1854 COLLINS, FREDERICK, M.D., Wanstead Lodge, Essex.
- 1865 COOPER, ALFRED, Surgeon to the Royal Hospital for Diseases of the Chest, Additional Surgeon for Out-patients to the Lock Hospital; Assistant-Surgeon to St. Mark's Hospital; Surgeon to the West London Hospital; 9, Henrietta street, Cavendish square, W.
- 1819 COOPER, GEORGE, Brentford, Middlesex.
- 1841 †COOPER, GEORGE LEWIS, one of the Surgeons to the National Vaccine Institution, and Teacher of Vaccination to the Medical School of University College; Surgeon to the Bloomsbury Dispensary; 7, Woburn place, Russell square. C. 1860-1. *Trans.* 1.

Elected

- 1843 COOPER, WILLIAM WHITE, Surgeon-Oculist in Ordinary to H.M. the Queen; Consulting Ophthalmic Surgeon to St. Mary's Hospital; 19, Berkeley square. C. 1858-9.
- 1841 COOTE, HOLMES, late Surgeon to, and Lecturer on Surgery at, St. Bartholomew's Hospital. S. 1853-4. C. 1864-5. *Trans.* 2.
- 1835 COPELAND, GEORGE FORD, 5, Bayshill villas, Cheltenham.
- 1868 CORNISH, WILLIAM ROBERT, Surgeon, Madras Army; Secretary to the Inspector-General, Indian Medical Department.
- 1860 *CORBY, THOMAS CHARLES STEUART, M.D., Surgeon to the Belfast General Dispensary; 9, Clarendon place, Belfast.
- 1839 *CORSELLIS, CHARLES CÆSAR, M.D., F.L.S., Benson, Oxon.
- 1853 CORY, WILLIAM GILLETT, M.D.
- 1847 COTTON, RICHARD PAYNE, M.D., Physician to the Hospital for Consumption and Diseases of the Chest; 46, Clarges street, Piccadilly. C. 1863.
- 1828 †COULSON, WILLIAM, F.L.S., Consulting Surgeon to St. Mary's Hospital, and to the German Hospital; 2, Frederick's place, Old Jewry, and 1, Chester terrace, Regent's park. C. 1831. L. 1832-7. V.P. 1851-2. *Trans.* 1.
- 1864 COULSON, WALTER JOHN, Surgeon to the Lock Hospital, 29, St. James's place.
- 1860 †COUPER, JOHN, Surgeon to, and Joint Lecturer on Surgery at, the London Hospital; Assistant-Surgeon to the Royal London Ophthalmic Hospital; 80, Grosvenor street.
- 1862 COWELL, GEORGE, Assistant-Surgeon to the Westminster Hospital; Assistant-Surgeon to the Royal Westminster Ophthalmic Hospital; Surgeon to the Victoria Hospital for Children; 65, Belgrave road, Pimlico.

Elected

- 1841 CRAWFORD, MERVYN ARCHDALL NOTT, M.D., Wiesbaden. C. 1853-4.
- 1868 CRAWFORD, THOMAS, M.D., Deputy Inspector-General of Hospitals (India); Umballah.
- 1869 *CRESSWELL, PEARSON R., Dowlais, Merthyr Tydvil.
- 1847 CRITCHETT, GEORGE, *Vice-President*, Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 21, Harley street, Cavendish square. C. 1865. V.P. 1872. *Trans.* 1.
- 1868 CROFT, JOHN, Surgeon to, and Lecturer on Operative Surgery at, St. Thomas's Hospital; 61, Brook street, Grosvenor square.
- 1862 CROMPTON, SAMUEL, M.D., Physician to the Salford Royal Hospital and Dispensary; 24, St. Ann's square, Manchester.
- 1837 CROOKES, JOHN FARRAR, 5, Waterloo crescent, Dover.
- 1860 CROSS, RICHARD, M.D., 5, Queen street, Scarborough.
- 1849 *CROWFOOT, WILLIAM EDWARD, Beccles, Suffolk.
- 1851 CUMMING, JAMES CAMERON, M.D.
- 1865 CURGENVEN, J. BRENDON, 11, Craven hill gardens, Bayswater.
- 1846 CURLING, HENRY, Surgeon to the Margate Royal Sea-Bathing Infirmary, and the Ramsgate Seamen's Infirmary; Ramsgate, Kent.
- 1837 †CURLING, THOMAS BLIZARD, F.R.S., *President*, Consulting-Surgeon to the London Hospital; 39, Grosvenor street. S. 1845-6. C. 1850. T. 1854-7. V.P. 1859. P. 1871-2. *Trans.* 13. *Pro.* 1. *Sci. Com.*
- 1847 CURREY, JOHN EDMUND, M.D., Lismore, County Waterford.
- 1822 CUSACK, CHRISTOPHER JOHN, Chateau d'Eu, France.
- 1852 CUTLER, THOMAS, M.D., Spa, Belgium.
- 1872 DALBY, WILLIAM BARTLETT, M.B., Lecturer on Aural Surgery at St. George's Hospital; 79, Grosvenor street.

Elected

- 1836 *DANIEL, JAMES STOCK, Ramsgate, Kent.
- 1848 DAUBENY, HENRY, M.D., San Remo, Italy.
- 1846 DAVIES, FREDERICK, M.D., 124, Gower street, Bedford square.
- 1853 DAVIES, ROBERT COKER NASH, Rye, Sussex.
- 1852 DAVIES, WILLIAM, M.D., 18, Gay street, Bath.
- 1852 DAVIS, JOHN HALL, M.D., Physician Accoucheur to, and Lecturer on Midwifery at, the Middlesex Hospital; Physician to the Royal Maternity Charity, and Consulting Physician-Accoucheur to the St. Pancras Infirmary; 24, Harley street, Cavendish square. C. 1869-70.
- 1818 DAWSON, JAMES, Wray Castle, Windermere.
- 1867 DAY, WILLIAM HENRY, M.D., Physician to the Samaritan Free Hospital for Women and Children; 10, Manchester square.
- 1867 DE MERIC, VICTOR, Surgeon to the Royal Free Hospital, and to the German Hospital, Dalston; 52, Brook street, Grosvenor square.
- 1846 *DENTON, SAMUEL BEST, M.D., Ivy Lodge, Hornsea, Hull.
- 1859 DICKINSON, WILLIAM HOWSHIP, M.D., Assistant-Physician to, and Lecturer on Materia Medica at, St. George's Hospital; Physician to the Hospital for Sick Children; 11, Chesterfield street, Mayfair. *Trans.* 10. *Sci. Com.*
- 1844 DICKSON, ROBERT, M.D., F.L.S. C. 1860.
- 1839 †DIXON, JAMES, Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Consulting Ophthalmic Surgeon to the Asylum for Idiots; 29, Lower Seymour street, Portman Square. L. 1849-55. V.P. 1857-8. T. 1863-4. C. 1866-7. *Trans.* 4.
- 1862 DOBELL, HORACE B., M.D., Physician to the Royal Hospital for Diseases of the Chest, City road; 84, Harley street. *Trans.* 1.

Elected

- 1845 DODD, JOHN.
- 1857 DOUGLAS, ARCHIBALD, M.D., 8, Clifton place, Sussex square, Hyde park.
- 1863 DOWN, JOHN LANGDON HAYDON, M.D., Physician to, and Lecturer on Medicine at, the London Hospital; 39, Welbeck street, Cavendish square. *Trans.* 2.
- 1867 DRAGE, CHARLES, M.D., Hatfield, Herts.
- 1853 DRUITT, ROBERT, M.R.C.P., 37, Hertford street, Mayfair. *Trans.* 2.
- 1865 DRYSDALE, CHARLES ROBERT, M.D., Physician to the Farringdon Dispensary; Assistant-Physician to the Metropolitan Free Hospital; 99, Southampton row, Russell square.
- 1865 DUCKWORTH, DYCE, M.D., Assistant-Physician to, and Lecturer on Skin Diseases at, St. Bartholomew's Hospital; 11, Grafton street, Bond street.
- 1845 DUFF, GEORGE, M.D., High street, Elgin.
- 1845 DUFFIN, EDWARD WILLSON, 18, Devonshire street, Portland place. *Trans.* 1.
- 1871 DUKE, BENJAMIN, 272, Kennington Park road.
- 1871 *DUKES, CLEMENT, M.B. and B.S., Horton crescent, Rugby, Warwickshire.
- 1867 DUKES, M. CHARLES, M.D., Canterbury road, Thornton Heath.
- 1833 †DUNN, ROBERT, 31, Norfolk street, Strand. C. 1845-6. *Trans.* 2.
- 1861 DU PASQUIER, CLAUDIUS FRANCIS, Surgeon-Apothecary to H.M. the Queen, and to the Household of H.R.H. the Prince of Wales; 62, Pall Mall.
- 1863 DURHAM, ARTHUR EDWARD, F.L.S., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; 82, Brook street, Grosvenor square. *Trans.* 5. *Sci. Com.*
- 1843 DURRANT, CHRISTOPHER MERCER, M.D., Physician to the East Suffolk and Ipswich Hospital; Ipswich, Suffolk.



Elected

- 1839 DYER, HENRY SUMNER, M.D., Sennowe Hall, Guist, Norfolk.
C. 1854-5.
- 1872 BAGER, REGINALD, M.D., Superintendent at St. Luke's
Hospital, Old street.
- 1836 EARLE, JAMES WILLIAM, late of Norwich.
- 1868 EASTES, GEORGE, M.B. Lond., Surgeon-Accoucheur to the
Western General Dispensary; 5, Albion place, Hyde
park square.
- 1824 EDWARDS, GEORGE.
- 1823 EGERTON, CHARLES CHANDLER, Kendall Lodge, Epping.
- 1869 ELAM, CHARLES, M.D, Assistant Physician to the National
Hospital for the Paralysed and Epileptic; 75, Harley
street, Cavendish square.
- 1861 *ELLIOT, ROBERT, M.D., Physician to the Carlisle Dispen-
sary; 35, Lowther street, Carlisle.
- 1848 ELLIS, GEORGE VINEY, Professor of Anatomy in University
College, London. C. 1863-4. *Trans.* 2.
- 1868 ELLIS, JAMES, M.D., 2, Langton villas, St. John's road,
Blackheath, and Infirmary, St. Pancras Workhouse.
- 1854 *ELLISON, JAMES, M.D., Surgeon-in-Ordinary to the Royal
Household, Windsor; 14, High street, Windsor.
- 1842 ERICHSEN, JOHN ERIC, Professor of Clinical Surgery in
University College, London, and Surgeon to University
College Hospital; 6, Cavendish place, Cavendish square.
C. 1855-6. V.P. 1868. *Trans.* 2.
- 1836 EVANS, GEORGE FABIAN, M.D., Birmingham.
- 1845 EVANS, WILLIAM JULIAN, M.D., Pinner, Middlesex.
- 1864 FAGGE, CHARLES HILTON, M.D., Assistant-Physician to, and
Lecturer on Hygiene at, Guy's Hospital; and Physician
to the Evelina Hospital for Sick Children; 11, St.
Thomas's street, Southwark. *Trans.* 4.
- 1869 FAIRBANK, FREDERICK ROYSTON, M.D., Lynton, North
Devon.
- 1858 FALCONER, RANDLE WILBRAHAM, M.D., Physician to the
Bath United Hospital; 22, Bennett street, Bath.

Elected

- 1862 FARQUHARSON, ROBERT, M.D., Junior United Service Club, Charles street, St. James' square.
- 1844 FARRE, ARTHUR, M.D., F.R.S., Physician-Accoucheur to H.R.H. the Princess of Wales; 12, Hertford street, Mayfair. C. 1857. V.P. 1864. *Sci. Com.*
- 1863 FENWICK, SAMUEL, M.D., Assistant-Physician to, and Lecturer on Histology at, the London Hospital; 29, Harley street, Cavendish square. *Trans.* 3.
- 1841 FERGUSSON, SIR WILLIAM, Bart., F.R.S., Sergeant-Surgeon to H.M. the Queen; Surgeon to King's College Hospital; 16, George street, Hanover square. C. 1849-50. V.P. 1863-4. *Trans.* 4.
- 1852 *FIELD, ALFRED GEORGE, late Surgeon to St. Mary's Hospital, Brighton.
- 1849 FINCHAM, GEORGE TUPMAN, M.D., Physician to, and Lecturer on Clinical Medicine at, the Westminster Hospital; 13, Belgrave road, Pimlico. C. 1871.
- 1866 FISH, JOHN CROCKETT, B.A., M.B., Camb., 92, Wimpole street, Cavendish square.
- 1836 †FISHER, SIR JOHN WILLIAM, 33, Park lane. C. 1843-4.
- 1860 FITZGERALD, THOMAS GEORGE, Surgeon-Major; 6, Savile row, Burlington gardens.
- 1866 FITZPATRICK, THOMAS, M.D., M.A., Dublin; Physician to the Western General Dispensary, 30, Sussex gardens, Hyde park.
- 1842 FLETCHER, THOMAS BELL ELCOCK, M.D., Physician to the Birmingham General Hospital; 7, Waterloo street, Birmingham. *Trans.* 1.
- 1864 *FOLKER, WILLIAM HENRY, Surgeon to the North Staffordshire Infirmary; Bedford House, Hanley, Staffordshire.
- 1848 FORBES, JOHN GREGORY, 82, Oxford terrace, Hyde park. C. 1868-9. *Trans.* 2.
- 1852 †FORSTER, JOHN COOPER, Surgeon to, and Lecturer on Surgery at, Guy's Hospital; 29, Upper Grosvenor street. C. 1868-9. *Pro.* 1.

Elected

- 1865 FOSTER, BALTHAZAR WALTER, M.D., Professor of Medicine at the Queen's College, Birmingham, and Physician to the Birmingham General Hospital; 16, Temple row, Birmingham, and Grosvenor house, Edgbaston.
- 1859 FOX, EDWARD LONG, M.B., Physician to the Bristol Royal Infirmary, and Lecturer on Medicine at the Bristol School of Medicine; Church house, Clifton, Gloucestershire.
- 1858 FOX, WILSON, M.D., F.R.S., Physician-Extraordinary to H.M. the Queen; Professor of Clinical Medicine in University College, London, and Physician to University College Hospital; 67, Grosvenor street. *Trans.* 2.
- 1871 FRANK, PHILIP, M.D., Cannes, France.
- 1843 FRASER, PATRICK, M.D. C. 1866.
- 1868 FREEMAN, WILLIAM HENRY, 29, Spring gardens.
- 1836 †FRENCH, JOHN GEORGE, Surgeon to the St. James's Infirmary; 41, Great Marlborough street, C. 1852-3.
- 1849 FRERE, ROBERT TEMPLE, M.A., F.R.C.P., 143, Harley street.
- 1846 FULLER, HENRY WILLIAM, M.D., Physician to St. George's Hospital; 13, Manchester square. C. 1862. S. 1864-5. V.P. 1868-9. *Trans.* 3.
- 1864 *GAIRDNER, WILLIAM TENNANT, M.D., Professor of the Practice of Medicine in the University of Glasgow; Physician to the Glasgow Royal Infirmary; 225, St. Vincent street, Glasgow.
- 1865 GANT, FREDERICK JAMES, Surgeon to the Royal Free Hospital; 16, Connaught square, Hyde park. *Trans.* 1.
- 1867 GARLAND, EDWARD CHARLES, L.R.C.P. Edin., Yeovil, Somerset.
- 1867 GARLIKE, THOMAS W., Tulse Hill, Brixton.
- 1854 GARROD, ALFRED BARING, M.D., F.R.S., Professor of Materia Medica in King's College, London, and Physician to King's College Hospital; Examiner in Materia Medica at the University of London; 11, Harley street, Cavendish square. C. 1867. *Trans.* 8.

Elected

- 1857 GASCOYEN, GEORGE GREEN, Surgeon to the Lock Hospital ; Assistant Surgeon to, and joint Lecturer on Surgery at, St. Mary's Hospital ; 48, Queen Anne street, Cavendish square. S. 1866-69. C. 1871-2. *Trans.* 3. *Sci. Com.* 2.
- 1851 GASKOIN, GEORGE, Surgeon to the British Hospital for Diseases of the Skin ; 7, Westbourne park.
- 1819 GAULTER, HENRY.
- 1848 GAY, JOHN, Senior Surgeon to the Great Northern Hospital, and Consulting Surgeon to the Asylum for Idiots ; 10, Finsbury place south.
- 1866 GEE, SAMUEL JONES, M.D., Assistant-Physician to St. Bartholomew's Hospital ; Assistant-Physician to the Hospital for Sick Children ; 54, Harley street, Cavendish square.
- 1821 *GEORGE, RICHARD FRANCIS, 20, Marlborough buildings, Bath.
- 1858 GODFREY, BENJAMIN, M.D., Carlton House, Enfield, Middlesex.
- 1870 GODSON, CLEMENT, M.B., C.M., Senior Obstetric Assistant at St. Bartholomew's Hospital ; 56, Maddox street, Bond street.
- 1867 GOODEVE, EDWARD, M.B., Hon. Physician to H.M. the Queen ; late Surgeon-Major, H.M.'s Bengal Army ; Drimagh, Stoke Bishop, near Bristol.
- 1851 GOODFELLOW, STEPHEN JENNINGS, M.D., 5, Savile row, Burlington gardens. C. 1864-5. *Trans.* 2.
- 1851 GOWLLAND, PETER YEAMES, Surgeon to St. Mark's Hospital ; 34, Finsbury square.
- 1844 GRANTHAM, JOHN, Crayford, Kent.
- 1846 GREAM, GEORGE THOMPSON, M.D., Physician-Accoucheur to H.R.H. the Princess of Wales ; 2, Upper Brook street, Grosvenor square. C. 1863.
- 1868 GREEN, T. HENRY, M.D., Senior Assistant-Physician to, and Lecturer on Pathology at, Charing Cross Hospital ; 74, Wimpole street, Cavendish square.

Elected

- 1843 GREENHALGH, ROBERT, M.D., Physician-Accoucheur to, and Lecturer on Midwifery at, St. Bartholomew's Hospital; Consulting Physician to the Samaritan Free Hospital for Women and Children, and to the City of London Lying-in Hospital; 72, Grosvenor street. C. 1871-2.
- 1860 GREENHOW, EDWARD HEADLAM, M.D., F.R.S., Physician to, and Lecturer on the Practice of Medicine at, the Middlesex Hospital; and Consulting Physician to the Western General Dispensary; 14A, Manchester square. *Trans.* 2.
- 1868 GRIGG, WILLIAM CHAPMAN, M.D.; 6, Curzon street, Mayfair.
- 1814 GROVE, JOHN, M.D., Salisbury.
- 1852 GROVE, JOHN, Spring Grove, Hampton, Middlesex.
- 1860 GUENEAU DE MUSSY, HENRI, M.D., late Physician to the French Hospital, Lisle street, Leicester square; Paris.
- 1849 GULL, SIR WILLIAM WITHEY, Bart., M.D., D.C.L., F.R.S., Physician-Extraordinary to the Queen; Member of the Senate of the University of London; 74, Brook street, Grosvenor square. C. 1864. *Trans.* 4.
- 1837 GULLY, JAMES MANBY, M.D., Great Malvern, Worcestershire.
- 1854 HABERSHON, SAMUEL OSBORNE, M.D., Physician to, and Lecturer on Materia Medica and Therapeutics at, Guy's Hospital; 70, Brook street, Grosvenor square. S. 1867. C. 1869-70. *Trans.* 3.
- 1849 HAILEY, HAMMETT, F.L.S., Tickford Lodge, Newport Pagnell, Bucks.
- 1848 HALLEY, ALEXANDER, M.D., F.G.S., 16, Harley street, Cavendish square.
- 1870 HAMILTON, ROBERT, Surgeon to the South Hospital, Liverpool; 1, Prince's road, Liverpool.
- 1838 †HANCOCK, HENRY, Consulting Surgeon to the Charing Cross Hospital; Surgeon to the Royal Westminster Ophthalmic Hospital; 76, Harley street, Cavendish square. C. 1851. V.P. 1869.

Elected

- 1848 *HARCOURT, GEORGE, M.D., Chertsey, Surrey.
- 1836 HARDING, JOHN FOSSE, Mount Sandford, Southborough, Tunbridge Wells. C. 1858-9.
- 1856 HARE, CHARLES JOHN, M.D., late Professor of Clinical Medicine in University College, London, and Physician to University College Hospital; 57, Brook street, Grosvenor square.
- 1857 HARLEY, GEORGE, M.D., F.R.S., 25, Harley street, Cavendish square. C. 1871-2. *Trans.* 1. *Sci. Com.* 2.
- 1864 HARLEY, JOHN, M.D., F.L.S., Assistant-Physician to, and Joint Lecturer on Physiology at, St. Thomas's Hospital, late Physician to the London Fever Hospital; 78, Upper Berkeley street, Portman square. *Trans.* 5.
- 1866 HARPER, PHILIP H., 30, Cambridge street, Hyde park.
- 1859 HARRIS, FRANCIS, M.D., F.L.S., Physician to St. Bartholomew's Hospital; 24, Cavendish square.
- 1870 HARRISON, REGINALD, Assistant Surgeon to the Liverpool Royal Infirmary, and Lecturer on Anatomy at the School of Medicine; 51, Rodney street, Liverpool.
- 1841 †HARVEY, WILLIAM, Surgeon to the Royal Dispensary for Diseases of the Ear, and to the Freemasons' Female Charity; Aural Surgeon to the Great Northern Hospital; 2, Soho square. C. 1854.
- 1854 HAVILAND, ALFRED.
- 1870 HAWARD, J. WARRINGTON, Assistant-Surgeon to the Hospital for Sick Children; 46, Queen Anne street, Cavendish square. *Trans.* 1.
- 1828 †HAWKINS, CÆSAR HENRY, F.R.S., Sergeant-Surgeon to H.M. the Queen, and Consulting Surgeon to St. George's Hospital; 26, Grosvenor street. C. 1830-1, 1860. V.P. 1838-9. T. 1841-4. P. 1855-6. *Trans.* 12.
- 1838 †HAWKINS, CHARLES, Inspector of Anatomical Schools in London; 27, Savile row, Burlington gardens. C. 1846-7. S. 1850. V.P. 1858. T. 1861-2. *Trans.* 2.

Elected

- 1848 HAWKSLEY, THOMAS, M.D., Physician to the Margaret street Dispensary for Consumption and Diseases of the Chest; 6, Brook street, Hanover square.
- 1860 HAYWARD, HENRY HOWARD, Assistant-Surgeon Dentist to, and Lecturer on Dental Surgery at, St. Mary's Hospital; 38, Harley street, Cavendish square.
- 1861 HAYWARD, WILLIAM HENRY, Church House, Oldbury, Worcestershire.
- 1848 *HEALE, JAMES NEWTON, M.D., Winchester, Hants.
- 1865 HEATH, CHRISTOPHER, Surgeon to University College Hospital, and Lecturer on Operative Surgery in University College, London; 9, Cavendish place, Cavendish square.
- 1850 HEATON, GEORGE, M.D., Boston, U.S.
- 1829 †HEBERDEN, THOMAS, M.D., 98, Park street, Grosvenor square.
- 1849 HENRIQUES, AMOS, M.D., Hon. Physician to the Spanish Embassy; 67, Upper Berkeley street, Portman square.
- 1821 HERBERSKI, VINCENT, M.D., Professor of Medicine in the University of Wilna.
- 1843 HEWETT, PRESCOTT GARDNER, Surgeon-Extraordinary to H.M. the Queen; Surgeon to St. George's Hospital: 1, Chesterfield street, Mayfair. C. 1859. V.P. 1866-7. *Trans.* 7. *Sci. Com.*
- 1855 HEWITT, GRAILY, M.D., Professor of Midwifery in University College, London, and Obstetric Physician to University College Hospital; Examiner in Midwifery at the University of London; 36, Berkeley square.
- 1872 HEYN, JULIUS CHARLES WILLIAM, M.D., 88, Lange voorhout, the Hague, Holland.
- 1868 HILL, JOHN DANIEL, Surgeon to the Royal Free Hospital; Surgeon to the Royal Orthopædic Hospital; 17, Guilford street, Russell Square.

Elected

- 1862 HILL, M. BERKELEY, M.B., Lond., Surgeon to University College Hospital, and Lecturer on Operative Surgery at University College, London; Surgeon for out-patients to the Lock Hospital; 55, Wimpole street, Cavendish square.
- 1867 HILL, SAMUEL, M.D., 22, Mecklenburgh square.
- 1841 †HILTON, JOHN, F.R.S., Surgeon-Extraordinary to H.M. the Queen; Consulting Surgeon to Guy's Hospital; Consulting Surgeon to the Royal General Dispensary, St. Pancras; 10, New Broad street, City. C. 1851. V.P. 1863-4. *Trans.* 4.
- 1868 HINTON, JAMES, Aural Surgeon to Guy's Hospital; 18, Savile row, Burlington gardens. *Trans.* 2.
- 1859 HIRD, FRANCIS, Surgeon to the Charing Cross Hospital; 13, Old Burlington street.
- 1861 *HOFFMEISTER, WILLIAM CARTER, M.D., Surgeon to H.M. the Queen in the Isle of Wight; Clifton House, Cowes, Isle of Wight.
- 1872 HOGG, FRANCIS ROBERTS, M.D., Assistant-Surgeon, Royal Artillery, Woolwich.
- 1843 HOLDEN, LUTHER, Surgeon to St. Bartholomew's Hospital; Consulting Surgeon to the Metropolitan Dispensary; Surgeon to the Foundling Hospital; 65, Gower street, Bedford square. C. 1859. L. 1865.
- 1814 †HOLLAND, SIR HENRY, Bart., M.D., D.C.L., LL.D., F.R.S., Physician in Ordinary to H.M. the Queen; 72, Brook street, Grosvenor square. C. 1817, 1833-4. V.P. 1826, 1840. *Trans.* 1.
- 1868 HOLLIS, WILLIAM AINSLIE, M.A., M.B., Camb., Physician to Casualty Department, St. Bartholomew's Hospital; 32, New Cavendish street, Cavendish square.
- 1861 HOLMAN, WILLIAM HENRY, M.B. Lond., 68, Adelaide road south, Hampstead.

Elected

- 1856 HOLMES, TIMOTHY, Surgeon to, and Lecturer on Surgery at, St. George's Hospital; Surgeon in Chief to the Metropolitan Police Force; Professor of Pathology and Surgery to the Royal College of Surgeons; 31, Clarges street, Piccadilly. C. 1869-70. *Trans.* 5. *Sci. Com.*
- 1846 HOLT, BARNARD WIGHT, Senior Surgeon to, and Lecturer on Clinical Surgery at, the Westminster Hospital; Medical Officer of Health for Westminster; 14, Savile row, Burlington gardens. C. 1862-3.
- 1846 HOLTHOUSE, CARSTEN, Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; 3, George street, Hanover square. C. 1863.
- 1865 HOWARD, BENJAMIN, M.D., Lecturer on Operative Surgery, and Surgeon to the Long Island College Hospital, New York; 327, West 23rd street, New York.
- 1865 HOWARD, EDWARD, M.D., Oaklands, Penge, Surrey.
- 1857 HULKE, JOHN WHITAKER, F.R.S., Surgeon to, and Lecturer on Practical Surgery at, the Middlesex Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 10, Old Burlington street. C. 1871-2 *Trans.* 4. *Sci. Com.*
- 1857 HULME, EDWARD CHARLES, Ophthalmic Surgeon to the Great Northern Hospital; Woodbridge road, Guildford. *Trans.* 1.
- 1844 HUMBY, EDWIN, M.D., 83, Hamilton terrace, St. John's wood. C. 1866-7
- 1855 HUMPHRY, GEORGE MURRAY, M.D., F.R.S., Surgeon to Addenbrooke's Hospital; Professor of Human Anatomy and Physiology in the Cambridge University Medical School; Lecturer on Anatomy and Physiology to the Royal College of Surgeons; Cambridge. *Trans.* 5.
- 1866 HUNTER, CHARLES, 30, Wilton place, Belgrave square.
- 1849 HUSSEY, EDWARD LAW, Senior Surgeon to the Radcliffe Infirmary, and Consulting Surgeon to the County Lunatic Asylum and the Warneford Asylum; 8, St. Aldate's, Oxford. *Trans.* 1.

Elected

- 1856 HUTCHINSON, JONATHAN, Surgeon to, and Lecturer on Surgery at, the London Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields, and to the Hospital for Diseases of the Skin; 4, Finsbury circus. C. 1870. *Trans.* 3. *Pro.* 2.
- 1820 HUTCHINSON, WILLIAM, M.D.
- 1840 †HUTTON, CHARLES, M.D., Senior Physician to the General Lying-in Hospital; 26, Lowndes street, Belgrave square. C. 1858-9.
- 1866 ILES, FRANCIS HENRY WILSON, M.D., Watford, Herts.
- 1847 IMAGE, WILLIAM EDMUND, Senior Surgeon to the Suffolk General Hospital; Bury St. Edmund's, Suffolk. *Trans.* 1.
- 1856 INGLIS, CORNELIUS, M.D., 9, Duke street, Portland place.
- 1871 JACKSON, J. HUGHLINGS, M.D., Physician to the London Hospital; Physician to the National Hospital for the Paralysed and Epileptic; 3, Manchester square.
- 1841 †JACKSON, PAUL, 24, Wimpole street, Cavendish square. C. 1862.
- 1868 JACKSON, THOMAS CARR, Surgeon to the Great Northern Hospital, and Surgeon to the National Orthopædic Hospital; 3, Weymouth street, Portland place.
- 1863 JACKSON, THOMAS VINCENT, Surgeon to the South Staffordshire General Hospital; Darlington st., Wolverhampton.
- 1841 JACOBOWICS, MAXIMILIAN MORITZ, M.D., Vienna.
- 1825 JAMES, JOHN B., M.D.
- 1839 JEFFREYS, JULIUS, F.R.S.
- 1840 *JENKS, GEORGE SAMUEL, M.D., 18, Circus, Bath.
- 1851 JENNER, SIR WILLIAM, Bart., M.D., K.C.B., D.C.L., F.R.S., Physician in Ordinary to H.M. the Queen, and to H.R.H. the Prince of Wales; Professor of Clinical Medicine in University College, London, and Physician to University College Hospital; 63, Brook street, Grosvenor square. C. 1864. *Trans.* 3.

Elected

- 1851 JOHNSON, EDMUND CHARLES, Corresponding Member of the Medical and Philosophical Society of Florence, and of "l'Institut Genevois."
- 1847 JOHNSON, GEORGE, M.D., F.R.S., Professor of the Principles and Practice of Medicine in King's College, London, and Physician to King's College Hospital; Member of the Senate of the University of London; 11, Savile row, Burlington gardens. C. 1862-4. V.P. 1870. *Trans.* 8.
- 1868 JOHNSTON, WILLIAM, M.D., 44, Princes square, Hyde park.
- 1848 JOHNSTONE, [JOHNSON], ATHOL ARCHIBALD WOOD, 20, Regency square, Brighton. *Trans.* 1.
- 1862 JONES, CHARLES HANDFIELD, M.B., F.R.S., Physician to, and Lecturer on Clinical Medicine at, St. Mary's Hospital; 49, Green street, Grosvenor square.
- 1844 †JONES, HENRY BENICE, M.A. M.D., D.C.L., F.R.S., Consulting Physician to St. George's Hospital; 84, Brook street, Grosvenor square. C. 1855-6. V.P. 1866. *Trans.* 11.
- 1837 †JONES, THOMAS WILLIAM, M.D., 55, St. John's park, Upper Holloway. C. 1858.
- 1859 JONES, WILLIAM PRICE, M.D., Claremont road, Surbiton, Kingston.
- 1865 JORDAN, FURNEAUX, Surgeon to the Queen's Hospital, and Professor of Surgery at the Queen's College, Birmingham; 16, Colmore row, Birmingham.
- 1816 *KAUFFMANN, GEORGE HERMANN, M.D., Hanover.
- 1848 *KENDELL, DANIEL BURTON, M.D., Heath House, Wakefield, Yorkshire.
- 1847 KEYSER, ALFRED, 21, Norfolk crescent, Oxford square.
- 1857 KIALLMARK, HENRY WALTER, 66, Princes square, Bayswater.
- 1851 KINGDON, JOHN ABERNETHY, *Vice-President*, Surgeon to the City of London Truss Society, and to the City Dispensary; 2, New Bank buildings, Lothbury. C. 1866-7. V.P. 1872. *Trans.* 1. *Sci. Com.*

Elected

- 1855 LANE, JAMES ROBERT, Surgeon to, and Lecturer on Surgery at, St. Mary's Hospital; Surgeon to the Lock Hospital; 2, Berkeley street, Piccadilly. C. 1870. *Trans.*].
- 1840 †LANE, SAMUEL ARMSTRONG, Consulting Surgeon to, and Lecturer on Clinical Surgery at, St. Mary's Hospital; Consulting Surgeon to the Lock Hospital; 2, Berkeley street, Piccadilly. C. 1849-50. V.P. 1865.
- 1865 LANGTON, JOHN, Assistant-Surgeon to, and Demonstrator of Anatomy at, St. Bartholomew's Hospital; Surgeon to the City of London Truss Society; 18, Harley street, Cavendish square.
- 1841 *LASHMAR, CHARLES, M.D., 83, North End, Croydon, Surrey.
- 1862 LATHAM, PETER WALLWORK, M.A., M.B., Physician to Addenbrooke's Hospital, Cambridge; Examiner for Medical Degrees in Cambridge University; 17, Trumpington street, Cambridge.
- 1816 LAWRENCE, G. E.
- 1840 LAYCOCK, THOMAS, M.D., F.R.S.E., Physician-in-Ordinary to H.M. the Queen in Scotland, Professor of the Practice of Medicine and of Clinical Medicine, and Lecturer on Psychology and Mental Diseases in the University of Edinburgh; 13, Walker street, Edinburgh.
- 1843 *LEACH, JESSE, Moss Hall, Heywood, Lancashire.
- 1868 LEARED, ARTHUR, M.D., Senior Physician to the Great Northern Hospital; 12, Old Burlington street.
- 1822 LEDSAM, JOHN JOSEPH, M.D., 17, Esplanade, Scarborough, Yorkshire.
1843. LEE, HENRY, Surgeon to St. George's Hospital; 9, Savile row, Burlington gardens. C. 1856-7. L. 1863-4. V.P. 1868-9. *Trans.* 11. *Pro.* 1. *Sci. Com.*
- 1822 †LEE, ROBERT, M.D., F.R.S., Corresponding Member of the Academy of Medicine, Paris; 4, Savile row, Burlington gardens. C. 1829, 1834. S. 1830-3. V.P. 1835. *Trans.* 27.

Elected

- 1869 LEGG, JOHN WICKHAM, M.D., Physician to Casualty Department, St. Bartholomew's Hospital; 47, Green street, Park lane.
- 1836 LEIGHTON, FREDERICK, M.D., Frankfort-on-the-Maine.
- 1872 LIESBREICH, RICHARD, M.D., Ophthalmic Surgeon and Lecturer on Ophthalmic Surgery at St. Thomas's Hospital; 16, Albemarle street, Piccadilly.
- 1806 LIND, JOHN, M.D.
- 1872 *LITTLE, DAVID, M.D., Surgeon to the Royal Eye Hospital, Manchester; 21, St. John's street, Manchester.
- 1871 LITTLE, LOUIS STROMEYER, late Surgeon to the London Hospital; Shanghai, China.
- 1870 LIVINGSTON, JOHN, M.D., New Barnet, Hertfordshire.
- 1819 LLOYD, ROBERT, M.D.
- 1820 LOCHER, J. G., M.C.D., Town Physician of Zurich. *Trans.* 2.
- 1824 †LOCOCK, SIR CHARLES, Bart., M.D., D.C.L., F.R.S., Member of the Senate of the University of London; 26, Hertford street, Mayfair. C. 1826. V.P. 1841. P. 1857-8. *Trans.* 1.
- 1846 LOMAX, HENRY THOMAS, Surgeon to the County Police; St. Mary's Grove, Stafford.
- 1860 LONGMORE, THOMAS, C.B., Hon. Surgeon to H.M. the Queen, Deputy Inspector-General, and Professor of Clinical and Military Surgery, Army Medical School, Royal Victoria Hospital, Netley, Southampton; Woolston Lawn, Woolston, Hants. *Trans.* 2.
- 1836 LÖWENFELD, JOSEPH S., M.D., Berbice.
- 1871 LOWNDS, THOMAS MACKFORD, M.D., late Professor of Anatomy and Physiology at Grant Medical College, Bombay; Egham Hill, Surrey.
- 1852 LUKE, JAMES, F.R.S., Consulting Surgeon to the London Hospital; Woolley Lodge, Maidenhead Thicket, Berks. C. 1858. *Trans.* 4.
- 1857 LYON, FELIX WILLIAM, M.D., 18, Buccleuch place, Edinburgh.

Elected

- 1867 MABERLY, GEORGE FREDERICK, Leamington, Warwickshire.
- 1867 MACCORMAC, WILLIAM, M.A., Senior Assistant-Surgeon to, and Lecturer on Practical Surgery at, St. Thomas's Hospital; 13, Harley street. *Trans.* 1.
- 1862 *M'DONNELL, ROBERT, M.D., F.R.S., Surgeon to Steevens' Hospital; 14, Lower Pembroke street, Dublin. *Trans.* 1.
- 1846 M'EWEN, WILLIAM, M.D., Surgeon to Chester Castle; 27, Nicholas street, Chester.
- 1866 MACGOWAN, ALEXANDER THORBURN, Kingswood park, near Bristol.
- 1823 †MACILWAIN, GEORGE, Consulting Surgeon to the Finsbury Dispensary, and to the St. Anne's Society's Schools; Matching, Harlow, Essex. C. 1829-30. V.P. 1848. *Trans.* 1.
- 1822 MACINTOSH, RICHARD, M.D.
- 1859 *M'INTYRE, JOHN, M.D., Odiham, Hants.
- 1854 *MACKINDER, DRAPEE, M.D., Consulting 'Surgeon to the Dispensary, Gainsborough, Lincolnshire.
- 1860 MACLEAN, JOHN, M.D., 24, Portman street, Portman square.
- 1849 MACLURE, DUNCAN MACLACHLAN, M.B., Lecturer on Physiology at the Westminster Hospital; Assistant-Physician to the National Hospital for the Paralysed and Epileptic; 34, Harley street, Cavendish square.
- 1842 MACNAUGHT, JOHN, M.D., 25, Bedford street, Liverpool.
- 1855 MARCET, WILLIAM, M.D., F.R.S.; 1, Place Massena, Nice. C. 1871. *Trans.* 2. *Sci. Com.*
- 1867 MARSH, F. HOWARD, Demonstrator of Anatomy at St. Bartholomew's Hospital; 38, Guilford street, Russell square.
- 1838 MARSH, THOMAS PARR, M.D.

Elected

- 1851 MARSHALL, JOHN, F.R.S., Professor of Surgery in University College, London, and Surgeon to University College Hospital; 10, Savile row, Burlington Gardens. C. 1866. *Trans.* 2.
- 1841 †MARTIN, SIR JAMES RANALD, C.B., F.R.S., Examining Medical Officer to the Secretary of State for India in Council; President of Medical Board for Examination of Officers of H.M.'s Indian Medical Service; Inspector General of Hospitals; 37, Upper Brook street, Grosvenor square. C. 1853. V.P. 1862.
- 1864 MASON, FRANCIS, Assistant-Surgeon to, and Lecturer on Anatomy at, St. Thomas's Hospital; 10, Conduit street, Regent street. *Trans.* 1.
- 1869 MAYO, CHARLES, M.B., New College, Oxford.
- 1839 MEADE, RICHARD HENRY, Consulting Surgeon to the Bradford Infirmary; Bradford, Yorkshire. *Trans.* 1.
- 1870 MEADOWS, ALFRED, M.D., Physician-Accoucheur to, and Lecturer on Midwifery at, St. Mary's Hospital; Physician to the Hospital for Women, Soho square; 27, George street, Hanover square.
- 1865 MEDWIN, AARON GEORGE, M.D., Dental Surgeon to the Royal Kent Dispensary, 11, Montpelier row, Blackheath, Kent.
- 1867 MEREDYTH, COLOMIATI, M.D., 76, Margaret Street, Cavendish square.
- 1837 MERRIMAN, SAMUEL WILLIAM JOHN, M.D., Consulting Physician-Accoucheur to the Westminster General Dispensary; Marlboro' House, Sandown, Isle of Wight. C. 1851-2. *Trans.* 1.
- 1852 MERRYWEATHER, JAMES, Consulting Surgeon to the National Dental Hospital; 25, Brook street, Grosvenor square.
- 1847 MERYON, EDWARD, M.D., F.G.S., 14, Clarges street, Piccadilly. L. 1859-60. C. 1864-5. V.P. 1868-9. *Trans.* 2.

Elected

- 1815 MEYER, AUGUSTUS, M.D., St. Petersburg.
- 1868 MICHELL, WILLIAM DANIEL, 13, Old Cavendish street, Cavendish square.
- 1840 MIDDLEMORE, RICHARD, Consulting Surgeon to the Birmingham Eye Hospital; 19, Temple row, Birmingham.
- 1854 MIDDLESHIP, EDWARD ARCHIBALD.
- 1863 MONRO, HENRY, M.D., Physician to St. Luke's Hospital; 13, Cavendish square. C. 1868.
- 1844 MONTEFIORE, NATHANIEL, 36, Hyde park gardens.
- 1836 MOORE, GEORGE, M.D., Priory Houses, Hastings, Sussex.
- 1861 MOREHEAD, CHARLES, M.D., Hon. Surgeon to H.M. the Queen; Deputy-Inspector General of Hospitals; 11, North manor place, Edinburgh.
- 1857 MORGAN, JOHN, 3, Sussex place, Hyde park gardens. *Trans.* 1.
- 1861 MORGAN, JOHN EDWARD, M.B., Physician to the Manchester Royal Infirmary, and Lecturer on Medicine at the Manchester Royal School of Medicine; 1, St. Peter's square, Manchester.
- 1851 MOUAT, FREDERIC JOHN, M.D., late Surgeon-Major, Bengal Army; late Inspector-General of Gaols in the Lower Provinces of the Bengal Presidency, and Member of the Senate of the University of Calcutta; 12, Durham villas, Kensington.
- 1868 MOXON, WALTER, M.D., F.L.S., Assistant-Physician to, and Lecturer on Morbid Anatomy at, Guy's Hospital; 6, Finsbury Circus. *Trans.* 1.
- 1856 MURCHISON, CHARLES, M.D., LL.D. Edinb., F.R.S., Physician to, and Lecturer on Medicine at, St. Thomas's Hospital, Consulting Physician to the London Fever Hospital; 79, Wimpole street, Cavendish square. C. 1870-71. *Trans.* 3.
- 1863 MYERS, ARTHUR B. R., Coldstream Guards' Hospital, Vincent square, Westminster; Windsor.

Elected

- 1859 NAYLER, GEORGE, Surgeon to the Hospital for Diseases of the Skin, Blackfriars; 3, Savile row, Burlington gardens.
- 1870 NEILD, JAMES EDWARD, M.D., Lecturer on Forensic Medicine in the University of Melbourne; 166, Collins street east, Melbourne, Victoria.
- 1835 †NELSON, THOMAS ANDREW, M.D., 10, Nottingham terrace, York gate, Regent's park.
- 1843 NEWTON, EDWARD, 4, Upper Wimpole street. C. 1863-4.
- 1868 NICHOLLS, JAMES, M.D., Duke street, Chelmsford, Essex.
- 1849 NORMAN, HENRY BURFORD, Portland Lodge, Southsea, Hants.
- 1847 *NOURSE, WILLIAM EDWARD CHARLES, Surgeon to the Brighton Children's Hospital; Surgeon to St. Mary's Hospital, Brighton; 11, Marlborough place, Brighton.
- 1849 NOVERRE, ARTHUR, 16, Park street, Grosvenor square. C. 1870-71.
- 1864 NUNN, THOMAS WILLIAM, Surgeon to the Middlesex Hospital; 8, Stratford place, Oxford street.
- 1870 NUNNELEY, FREDERICK BARHAM, M.D., late Assistant-Physician to the Hospital for Sick Children; Burton-on-Trent. *Trans.* 2.
- 1847 O'CONNOR, THOMAS, March, Cambridgeshire.
- 1843 O'CONNOR, WILLIAM, M.D., Senior Physician to the Royal Free Hospital; 30, Upper Montagu street, Montagu square.
- 1858 OGLE, JOHN WILLIAM, M.D., Physician to, and Lecturer on Pathology at, St. George's Hospital; Inspector of Anatomy for the Provinces; 30, Cavendish square. *Trans.* 4.
- 1855 *OGLE, WILLIAM, M.A., M.D., Physician to the Derby Infirmary; 3, Stewart terrace, Derby.
- 1860 OGLE, WILLIAM, M.D., Lecturer on Physiology at St. George's Hospital; 4, Bridge House, Lynmouth, North Devon. S. 1868-70. *Trans.* 4.

Elected

- 1870 OLDHAM, CHARLES FREDERIC, India [Agents: Messrs. Grindlay and Co., 55, Parliament Street].
- 1850 OLDHAM, HENRY, M.D., Consulting Obstetric Physician to Guy's Hospital; 4, Cavendish place, Cavendish square. C. 1865. *Trans.* 1.
- 1871 *O'NEILL, WILLIAM, M.D., Physician to the Lincoln Lunatic Hospital, Lincoln.
- 1846 *ORMEROD, EDWARD LATHAM, M.D., F.R.S., Physician to the Sussex County Hospital; 14, Old Steine, Brighton. *Trans.* 2.
- 1847 *PAGE, WILLIAM BOUSFIELD, Surgeon to the Cumberland Infirmary, Carlisle. *Trans.* 2.
- 1840 †PAGET, SIR JAMES, Bart., D.C.L., F.R.S., Sergeant-Surgeon Extraordinary to H.M. the Queen; Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. Bartholomew's Hospital; Member of the Senate of the University of London; 1, Harewood place, Hanover square. C. 1848-49. V.P. 1861. T. 1867. *Trans.* 9. *Sci. Com.*
- 1858 *PALEY, WILLIAM, M.D., Physician to the Ripon Dispensary; Ripon, Yorkshire.
- 1847 PARKER, NICHOLAS, M.D., Paris.
- 1841 PARKIN, JOHN, M.D., Rome.
- 1851 PART, JAMES, M.D., 89, Camden road, Camden town.
- 1828 †PARTRIDGE, RICHARD, F.R.S., Professor of Anatomy to the Royal Academy of Arts; Consulting Surgeon to King's College Hospital, and Professor of Anatomy in King's College, London; 18, Wimpole street, Cavendish square. S. 1832-6. C. 1837-8, 1861-2. V.P. 1847-8. P. 1863-4.
- 1865 PAVY, FREDERICK WILLIAM, M.D., F.R.S., Physician to, and Lecturer on Physiology at, Guy's Hospital; 35, Grosvenor street.
- 1869 PAYNE, JOSEPH FRANK, M.B., Assistant-Physician to St. Thomas's Hospital; 6, Savile row, Burlington gardens.

Elected

- 1845 PEACOCK, THOMAS BEVILL, M.D., Physician to, and Lecturer on Medicine at, St. Thomas's Hospital; Physician to the City of London Hospital for Diseases of the Chest, Victoria Park; 20, Finsbury circus. S. 1855-6. V.P. 1867. C. 1869. *Trans.* 2.
- 1864 PEARSON, DAVID RITCHIE, M.D., 23, Upper Phillimore place, Kensington.
- 1856 PEIRCE, RICHARD KING, 16, Norland place, Notting hill.
- 1830 PELECHIN, CHARLES P., M.D., St. Petersburg.
- 1855 *PEMBERTON, OLIVER, Surgeon to the Birmingham General Hospital, and Professor of Surgery at the Queen's College, Birmingham; 18, Temple row, Birmingham. *Trans.* 1.
- 1870 PERRIN, J. BESWICK, Demonstrator of Anatomy at King's College, London; 68, Wimpole street.
- 1852 PHILLIPS, RICHARD, 27, Leinster square, Westbourne grove.
- 1846 PHILP, FRANCIS RICHARD, M.D., Colby House, Kensington.
- 1867 PICK, THOMAS PICKERING, Assistant-Surgeon to, and Lecturer on Surgery at, St. George's Hospital; 7, South Eaton place, Eaton square. *Sci. Com.*
- 1851 *PICKFORD, JAMES HOLLINS, M.D., M.R.I.A., 1, Cavendish place, Brighton.
- 1841 †PITMAN, HENRY ALFRED, M.D., Consulting Physician to St. George's Hospital, and to the Royal General Dispensary, St. Pancras; 28, Gordon square. L. 1851-3. C. 1861-2. T. 1863-8. V.P. 1870-1.
- 1871 POLLOCK, ARTHUR JULIUS, M.D., Physician to Charing Cross Hospital; Physician to the Foundling Hospital; 85, Harley street, Cavendish square.
- 1845 POLLOCK, GEORGE DAVID, Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Surgeon to St. George's Hospital; 36, Grosvenor street. C. 1856-7. L. 1859-62. V.P. 1870-1. *Trans.* 3.

Elected

- 1865 POLLOCK, JAMES EDWARD, M.D., Physician to the Hospital for Consumption, Brompton ; 52, Upper Brook street, Grosvenor square.
- 1871 POORE, GEORGE VIVIAN, M.B., Assistant-Physician to, and Lecturer on Forensic Medicine at, Charing Cross Hospital ; 30, Wimpole street.
- 1843 POPE, CHARLES, M.D., Glastonbury, Somersetshire.
- 1846 POTTER, JEPHSON, M.D., F.L.S., Physician to the Liverpool General Hospital for Consumption and Diseases of the Chest ; 6, Soho street, Liverpool.
- 1842 POWELL, JAMES, M.D.
- 1867 POWELL, RICHARD DOUGLAS, M.D., Assistant-Physician to, and Lecturer on Materia Medica at, Charing Cross Hospital ; Assistant-Physician to the Hospital for Consumption, Brompton ; 15, Henrietta street, Cavendish square.
- 1867 POWER, HENRY, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. Bartholomew's Hospital ; Examiner in Physiology at the University of London ; 37A, Gt. Cumberland place, Hyde park. *Sci. Com.*
- 1857 PRIESTLEY, WILLIAM OVEREND, M.D., Physician-Accoucheur to H.R.H. the Princess Louis of Hesse ; Consulting Physician-Accoucheur to the St. Marylebone Infirmary ; 17, Hertford street, Mayfair. *Sci. Com.*
- 1869 PULLAR, ALFRED, M.D., 47, Kensington park gardens.
- 1850 QUAIN, RICHARD, M.D., F.R.S., Physician to the Hospital for Consumption and Diseases of the Chest ; Member of the Senate of the University of London ; 67, Harley street, Cavendish square. C. 1866-7. *Trans.* 1. *Sci. Com.*
- 1835 †QUAIN, RICHARD, F.R.S., Surgeon-Extraordinary to H.M. the Queen ; Emeritus Professor of Clinical Surgery, University College, London, and Consulting Surgeon to the Eye Infirmary attached to the Hospital ; 32, Cavendish square. C. 1838-9. L. 1846-8. T. 1851-3. V.P. 1856-7. *Trans.* 1. *Pro.* 2.

Elected

- 1852 RADCLIFFE, CHARLES BLAND, M.D., Physician to the Westminster Hospital ; Physician to the National Hospital for the Paralysed and Epileptic ; 25, Cavendish square. C. 1867-8.
- 1871 RALFE, CHARLES HENRY, M.D., M.A., 26, Queen Anne street, Cavendish square.
- 1857 RANKE, HENRY, M.D., Munich.
- 1854 RANSOM, WILLIAM HENRY, M.D., F.R.S., Physician to the Nottingham General Hospital ; the Pavement, Nottingham.
- 1869 READ, THOMAS LAURENCE, 11, Petersham terrace, Queen's gate, Kensington.
- 1858 REED, FREDERICK GEORGE, M.D., 46, Hertford street, Mayfair. *Trans.* 1.
- 1821 REEDER, HENRY, M.D., Varick, Seneca County, New York, United States.
- 1857 REES, GEORGE OWEN, M.D., F.R.S., Physician to, and Lecturer on Medicine at, Guy's Hospital ; 26, Albemarle street, Piccadilly. *Trans.* 1.
- 1869 REEVES, WILLIAM, 5, the Crescent, Carlisle.
- 1855 REYNOLDS, JOHN RUSSELL, M.D., F.R.S., Professor of the Principles and Practice of Medicine in University College, London, and Physician to University College Hospital ; Examiner in Medicine at the University of London ; 38, Grosvenor street. C. 1870.
- 1865 RHODES, GEORGE WINTER, Surgeon to the Huddersfield Infirmary ; Queen street south, Huddersfield.
- 1847 RICHARDS, SAMUEL, M.D., 36, Bedford square.
- 1852 RICHARDSON, CHRISTOPHER THOMAS, M.B., Warcop, Penrith.
- 1849 *RICHARDSON, WILLIAM, M.D.
- 1869 RICKARDS, WALTER, M.D., Physician to the Royal Free Hospital ; 8, Cavendish place, Cavendish square.
- 1845 RIDGE, BENJAMIN, M.D., 21, Bruton street, Berkeley square.

Elected

- 1843 RIDGE, JOSEPH, M.D., 39, Dorset square. C. 1858.
Pro 1.
- 1863 RINGER, SYDNEY, M.D., Professor of Materia Medica in University College, London, and Physician to University College Hospital; 15, Cavendish place, Cavendish square.
- 1872 RITCHIE, CHRISTOPHER CURRIE, M.D., Physician to the Hulme Dispensary, Manchester; Moss side view, Manchester.
- 1871 RIVINGTON, WALTER, M.S., Surgeon to, and Lecturer on Anatomy at, the London Hospital; 22, Finsbury square.
- 1871 *ROBERTS, DAVID LLOYD, M.D., Surgeon to St. Mary's Hospital, Manchester; 23, St. John's street, Deansgate, Manchester.
- 1852 ROBERTS, JOHN, M.R.C.P., the Park, Westow hill, Upper Norwood.
- 1857 ROBERTSON, JOHN CHARLES GEORGE, Medical Superintendent of the Cavan District Lunatic Asylum; Monaghan, Ireland.
- 1862 ROBINSON, CHARLES, F.R.C.P. Edinb., 12, Hereford gardens, Park lane, W.
- 1843 ROBINSON, GEORGE, M.D. *Trans.* 2.
- 1843 RODEN, WILLIAM, M.D., the Grange, Kidderminster, Worcestershire.
- 1835 †ROE, GEORGE HAMILTON, M.D., Consulting Physician to the Hospital for Consumption and Diseases of the Chest; 13, Great Cumberland place, Hyde park. C. 1841-2. *Trans.* 1.
- 1829 ROOTS, WILLIAM SUDLOW, F.L.S., Surgeon to the Royal Establishment at Hampton Court; Kingston, Surrey.
- 1850 ROPER, GEORGE, Bank House, Aylsham, Norfolk.
- 1857 ROSE, HENRY COOPER, M.D., F.L.S., Surgeon to the Hampstead Dispensary; High street, Hampstead. *Trans.* 1.

Elected

- 1849 ROUTH, CHARLES HENRY FELIX, M.D., Physician to the Samaritan Free Hospital for Women and Children ; 52, Montagu square. *Trans.* 1.
- 1863 ROWE, THOMAS SMITH, M.D., Surgeon to the Royal Sea-Bathing Infirmary ; Cecil street, Margate, Kent.
- 1834 RUMSEY, HENRY WYLDBORE, Priory House, Cheltenham.
- 1845 RUSSELL, JAMES, M.D., Physician to the Birmingham General Hospital, and Professor of Medicine at Queen's College, Birmingham ; 91, New Hall street, Birmingham.
- 1871 RUTHERFORD, WILLIAM, M.D., F.R.S.E., Professor of Physiology at King's College, London, Fullerian Professor of Physiology to the Royal Institution ; 12, Upper Berkeley street, Portman square.
- 1856 SALTER, S. JAMES A., F.R.S., F.L.S., Dental Surgeon to, and Lecturer on Dental Surgery at, Guy's Hospital ; 17, New Broad street, City. C. 1871. *Trans.* 2.
- 1849 SANDERSON, HUGH JAMES, M.D., 26, Upper Berkeley street, Portman square. C. 1872.
- 1855 SANDERSON, JOHN BURDON, M.D., F.R.S., Professor of Practical Physiology at University College ; 49, Queen Anne street, Cavendish square. C. 1869-70. *Trans.* 1. *Sci. Com.* 2.
- 1867 SANDFORD, FOLLIOTT JAMES, M.D., Market Drayton, Shropshire.
- 1847 SANKEY, WILLIAM HENRY OCTAVIUS, M.D., Lecturer on Mental Diseases at University College, London ; Sandywell park, Cheltenham.
- 1869 SANSOM, ARTHUR ERNEST, M.D., Physician to the Royal Hospital for Diseases of the Chest, City road ; 29, Duncan terrace, Islington. *Trans.* 1.
- 1845 SAUNDERS, EDWIN, Surgeon-Dentist to H.M. the Queen, and to H.R.H. the Prince of Wales ; 13A, George street, Hanover square. C. 1872.
- 1834 SAUVAN, LUDWIG V., M.D., Warsaw.

Elected

- 1859 SAVORY, WILLIAM SCOVELL, F.R.S., Surgeon to, and Lecturer on Surgery at, St. Bartholomew's Hospital; Surgeon to Christ's Hospital, 66, Brook street, Grosvenor square. C. 1871-2. *Trans. 3. Sci. Com. 3.*
- 1853 SCHULHOF, MAURICE, M.D., 46, Brook street, Grosvenor square.
- 1861 *SCOTT, WILLIAM, M.D., Physician to the Huddersfield Infirmary; Waverley House, Huddersfield.
- 1863 SEDGWICK, WILLIAM, Surgeon to the St. Marylebone Provident Dispensary; 12, Park place, Upper Baker street. *Trans. 2.*
- 1856 SERCOMBE, EDWIN, 41, Brook street, Grosvenor square. *Trans. 1. Pro. 1.*
- 1840 SHARP, WILLIAM M.D., F.R.S., Horton House, Rugby. *Trans. 1.*
- 1837 †SHARPEY, WILLIAM, M.D., F.R.S., LL.D., Professor of Anatomy and Physiology in University College, London; Member of the Senate of the University of London; Secretary of the Royal Society; University College, and Lawnbank, Hampstead. C. 1848-9. V.P. 1862.
- 1836 †SHAW, ALEXANDER, Consulting Surgeon to the Middlesex Hospital; 136, Abbey road, Kilburn. C. 1842. S. 1843-4. V.P. 1851-2. T. 1858-60. *Trans. 4.*
- 1848 *SHEARMAN, EDWARD JAMES, M.D., F.R.S. Edin., F.L.S., Consulting Physician to the Rotherham Dispensary; Moorgate, Rotherham, Yorkshire.
- 1859 SIBLEY, SEPTIMUS WILLIAM, 12, New Burlington street. *Trans. 4. Sci. Com.*
- 1849 SIBSON, FRANCIS, M.D., F.R.S., Consulting Physician to St. Mary's Hospital; Member of the Senate of the University of London; 59, Brook street, Grosvenor square. C. 1863-4. *Trans. 1. Sci. Com.*
- 1848 SIEVEKING, EDWARD HENRY, M.D., Physician-in-Ordinary to H.R.H. the Prince of Wales; Physician to St. Mary's Hospital; 17, Manchester square. C. 1859-60. S. 1861-3. *Trans. 2. Sci. Com.*

Elected

- 1871 SILVER, ALEXANDER, M.D., Physician to, and Lecturer on Physiology at, Charing Cross Hospital; 2, Stafford street, Bond street.
- 1842 SIMON, JOHN, D.C.L., F.R.S., Surgeon to St. Thomas's Hospital; Medical Officer of the Privy Council; 3, Parliament street, and 40, Kensington square. C. 1854-5. V.P. 1865. *Trans.* 1.
- 1865 SIMS, J. MARION, M.D., 47, Faubourg St. Honoré, Paris.
- 1857 SIORDET, JAMES LEWIS, M.B., Villa Preti, Mentone, Nice.
- 1852 SMITH, CHARLES CASE, Consulting Surgeon to the Suffolk General Hospital.
- 1872 SMITH, GILBART, M.B., 68, Harley street, Cavendish square.
- 1866 SMITH, HEYWOOD, M.A. M.D. Oxon., Physician to the Hospital for Women; Physician to the British Lying-in Hospital; 2, Portugal street, Grosvenor square.
- 1835 SMITH, JOHN GREGORY, Medical Superintendent, Atkinson-Morley Convalescent Hospital, Copse Hill, Wimbledon, Surrey.
- 1843 SMITH, ROBERT WILLIAM, M.D., M.R.I.A., Professor of Surgery in the University of Dublin; Surgeon to the Richmond Hospital; Surgeon to Sir Patrick Dun's Hospital; 67, Eccles street, Dublin.
- 1838 †SMITH, SPENCER, Surgeon to, and Lecturer on Clinical Surgery at, St. Mary's Hospital; 9, Queen Anne street, Cavendish square. C. 1854. S. 1855-8. V.P. 1859-60. T. 1865.
- 1863 SMITH, THOMAS, *Secretary*; Assistant-Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital; Surgeon to the Hospital for Sick Children; 5, Stratford place, Oxford street. S. 1870-2. *Trans.* 3. *Sci. Com.*
- 1864 *SMITH, THOMAS HECKSTALL, Rowlands, St. Mary Cray, Kent.
- 1845 SMITH, WILLIAM, 70, Pembroke road, Clifton, Bristol. *Trans.* 1.
- 1847 SMITH, WILLIAM J., M.D., Consulting Physician to the Weymouth Infirmary; Greenhill, Weymouth, Dorsetshire.

Elected

- 1850 SMITH, WILLIAM TYLER, M.D., Consulting Physician-Accoucheur to St. Mary's Hospital; 21, Upper Grosvenor street, W. C. 1867-8. *Trans.* 2.
- 1868 SOLLY, SAMUEL EDWIN, 11, Cleveland road, Barnes.
- 1866 SOUTHAM, GEORGE, Surgeon to the Manchester Royal Infirmary, and Lecturer on Surgery at the Manchester Royal School of Medicine; 10, Lever street, and Oakfield, Pendleton, Manchester. *Trans.* 4.
- 1865 SOUTHEY, REGINALD, M.D., Physician to, and Lecturer on Forensic Medicine at, St. Bartholomew's Hospital; 6, Harley street, Cavendish square.
- 1844 SPACKMAN, FREDERICK R., M.D., Harpenden, St. Albans.
- 1851 SPITTA, ROBERT JOHN, M.B., Medical Officer to the Clapham General Dispensary; Clapham Common, Surrey. *Trans.* 1.
- 1843 *SPRANGER, STEPHEN, Cape Town, South Africa.
- 1867 SQUAREY, CHARLES EDWARD, M.B., Assistant-Physician to the Hospital for Women; 13, Upper Wimpole street. *Trans.* 2.
- 1851 STARTIN, JAMES, Senior Surgeon to the Hospital for Diseases of the Skin, Blackfriars; 3, Savile row, Burlington gardens.
- 1854 STEVENS, HENRY, M.D., Medical Department, Privy Council Office, 3, Parliament street, Whitehall.
- 1842 STEWART, ALEXANDER PATRICK, M.D., *Vice-President*; Consulting Physician to the Middlesex Hospital; 75, Grosvenor street. C. 1856-7. L. 1863-8. V.P. 1871-2.
- 1859 STEWART, WILLIAM EDWARD, 12, Weymouth street, Portland place.
- 1856 STOCKER, ALONZO HENRY, M.D., Peckham House, Peckham.
- 1865 STOKES, WILLIAM, Jun., M.D., Lecturer on Surgery at the Carmichael School of Medicine, and Surgeon to the Richmond Surgical Hospital; 3, Clare street, Merrion square, Dublin. *Trans.* 1.

Elected

- 1843 STORKS, ROBERT REEVE, Paris.
- 1858 †STREATFEILD, JOHN FREMLYN, Surgeon to the Royal London Ophthalmic Hospital, Moorfields ; 15, Upper Brook street, Grosvenor square.
- 1871 STRONG, HENRY JOHN, M.D., 64, North End, Croydon.
- 1863 STURGES, OCTAVIUS, M.D., Assistant-Physician to, and Lecturer on Materia Medica at, the Westminster Hospital ; 85, Wimpole street, Cavendish square.
- 1871 SUTHERLAND, HENRY, M.B., Lecturer on Insanity at the Westminster Hospital ; 6, Richmond terrace, Whitehall.
- 1869 SUTRO, SIGISMUND, M.D., Senior Physician to the German Hospital ; 37A, Finsbury square.
- 1871 SUTTON, HENRY GAWEN, M.B., Assistant-Physician to, and Lecturer on Pathology at, the London Hospital, and Physician to the City of London Hospital for Diseases of the Chest ; 9, Finsbury square. *Trans.* 1.
- 1855 SUTTON, JOHN MAULE, M.D., St. Clairs, Dartmouth, Devon.
- 1861 *SWEETING, GEORGE BACON, King's Lynn, Norfolk.
- 1854 *SYMONDS, FREDERICK, Surgeon to the Radcliffe Infirmary, and Consulting Surgeon to the Oxford Dispensary ; 35, Beaumont street, Oxford.
- 1870 TAIT, ROBERT LAWSON, Surgeon to the Birmingham Lying-in Charity, and to the Hospital for Women ; 7, Waterloo street, Birmingham.
- 1844 TAMPLIN, RICHARD WILLIAM, 33, Old Burlington street.
- 1864 TAUSSIG, GABRIEL, M.D., 70, Piazza Barberini, Rome.
- 1852 TAYLOR, ROBERT, Surgeon to the Central London Ophthalmic Hospital, and to the Cripples' Home, Marylebone road ; 7, Lower Seymour Street, Portman square.
- 1845 TAYLOR, THOMAS, Warwick House, Warwick place, Grove End road, St. John's wood.
- 1859 TEGART, EDWARD, 49, Jermyn street, St. James's.

Elected

- 1862 THOMPSON, EDMUND SYMES, M.D., *Secretary*; Physician to the Hospital for Consumption, Brompton; Gresham Professor of Medicine; 3, Upper George street, Portman square. S. 1871-2.
- 1857 THOMPSON, HENRY, M.D., Physician to the Middlesex Hospital; 53, Queen Anne street, Cavendish square.
- 1852 THOMPSON, SIR HENRY, Surgeon-Extraordinary to H.M. the King of the Belgians; Professor of Clinical Surgery in University College, London, and Surgeon to University College Hospital; 35, Wimpole street, Cavendish square. C. 1869. *Trans.* 4.
- 1862 THOMPSON, REGINALD EDWARD, M.D., Assistant-Physician to the Hospital for Consumption, Brompton; 21, South street, Park lane. *Trans.* 1. *Sci. Com.*
- 1836 THURNHAM, JOHN, M.D., Resident Medical Superintendent of the Wilts County Asylum, Devizes, Wiltshire. *Trans.* 4.
- 1848 TILT, EDWARD JOHN, M.D., Consulting Physician to the Farringdon General Dispensary and Lying-in Charity; 60, Grosvenor street.
- 1872 TOMES, CHARLES S., B.A., Assistant-Surgeon to the Dental Hospital; 37, Cavendish square.
- 1867 TONGE, MORRIS, M.D., Harrow-on-the-Hill, Middlesex.
- 1828 TORRIE, JAMES, M.D.
- 1871 *TREND, THEOPHILUS W., M.R.C.P. Edinb., Raeberry Lodge, Southampton.
- 1867 TROTTER, JOHN WILLIAM, Assistant-Surgeon, Coldstream Guards; Hospital, Vincent square, Westminster.
- 1859 TRUMAN, EDWIN THOMAS, Surgeon-Dentist in Ordinary to Her Majesty's Household; 23, Old Burlington street.
- 1864 TUFNELL, THOMAS JOLLIFFE, Examiner in Surgery to the Royal College of Surgeons of Ireland; 58, Lower Mount street, Merrion square, Dublin.
- 1862 TUKE, THOMAS HARRINGTON, M.D., Manor House, Chiswick, and 37, Albemarle street, Piccadilly.

Elected

- 1855 TULLOCH, JAMES STEWART, M.D., 1, Pembridge place, Bayswater.
- 1845 TURNER, THOMAS, F.L.S., Consulting Surgeon to the Manchester Royal Infirmary; 77, Mosley street, Manchester.
- 1870 VENNING, EDGCOMBE, Assistant-Surgeon, 1st Life Guards; Knightsbridge Barracks, and 24, Belgrave square.
- 1865 VERNON, BOWATER JOHN, Ophthalmic Surgeon to St. Bartholomew's Hospital, and Ophthalmic Surgeon to the West London Hospital; 44A, Wimpole street, Cavendish square.
- 1867 VINTRAS, ACHILLE, M.D., Physician to the French Hospital, Lisle street, Leicester square; 141, Regent street.
- 1828 VULPES, BENEDETTO, M.D., Physician to the Hospital of Aversa, and the Hospital of Incurables, Naples.
- 1854 WADDINGTON, EDWARD, Auckland, New Zealand.
- 1870 WADHAM, WILLIAM, M.D., Physician to, and Lecturer on Medical Jurisprudence at, St. George's Hospital; 12, Park lane.
- 1864 WAITE, CHARLES DERBY, M.B., Senior Physician to the Westminster General Dispensary; 3, Old Burlington street.
- 1868 *WALKER, ROBERT, L.R.C.P. Edinb., Surgeon to the Carlisle Dispensary; 25, Lowther street, Carlisle.
- 1867 *WALLIS, GEORGE, Benet street, Cambridge.
- 1861 *WALSH, JAMES, M.D., Staff-Surgeon, R.N., 41, Cathrine street, Limerick, Ireland.
- 1852 WALSHE, WALTER HAYLE, M.D., Emeritus Professor of the Principles and Practice of Medicine, University College, London; Consulting Physician to the Hospital for Consumption; 37, Queen Anne street, Cavendish square. C. 1872. *Trans.* 1.
- 1851 WALTON, HENRY HAYNES, Surgeon to St. Mary's Hospital, and to the Ophthalmic Department; 1, Brook street, Hanover square. *Trans.* 1. *Pro.* 1.

- 1852 WANE, DANIEL, M.D., 20, Grafton street, Berkeley square.
- 1821 WARD, WILLIAM TILLEARD.
- 1858 WARDELL, JOHN RICHARD, M.D., Tunbridge Wells.
- 1846 WARE, JAMES THOMAS, Surgeon to the Metropolitan Convalescent Institution; 18, Gordon square, and Tilford House, near Farnham, Surrey.
- 1818 WARE, JOHN, Clifton Down, near Bristol.
- 1866 WARING, EDWARD JOHN, M.D. [Agents: Messrs. Grindlay and Co., 55, Parliament street]; 49, Clifton gardens, Maida vale.
- 1861 WATERS, A. T. HOUGHTON, M.D., Physician to the Liverpool Northern Hospital, and Lecturer on Anatomy and Physiology in the Liverpool Royal Infirmary School of Medicine; 27, Hope street, Liverpool. *Trans.* 3.
- 1837 †WATSON, SIR THOMAS, Bart., M.D., D.C.L., F.R.S., Physician-in-Ordinary to H.M. the Queen; Consulting Physician to King's College Hospital; 16, Henrietta street, Cavendish square. C. 1840-1, 1852. V.P. 1845-6.
- 1861 †WATSON, WILLIAM SPENCER, M.B., Surgeon to the Great Northern Hospital; Surgeon to the Royal South London Ophthalmic and to the Central London Ophthalmic Hospitals; 7, Henrietta street, Cavendish square.
- 1854 WEBB, WILLIAM, M.D., Gilkin View House, Wirksworth, Derbyshire.
- 1840 WEBB, WILLIAM WOODHAM, M.D.
- 1842 WEBER, FREDERIC, M.D., 44, Green street, Park lane. C. 1857. V.P. 1865.
- 1857 WEBER, HERMANN, M.D., Physician to the German Hospital; 10, Grosvenor street, Grosvenor square. *Trans.* 6.

Elected

- 1835 †WEBSTER, JOHN, M.D., F.R.S., Physician to the Scottish Hospital, and Consulting Physician to the St. George's and St. James's Dispensary; 9, Queen street, St. Andrew's. C. 1843-4. V.P. 1855-6. *Trans.* 6. *Pro.* 1.
- 1844 WEGG, WILLIAM, M.D., Physician to the St. George's Dispensary; 15, Hertford street, Mayfair. L. 1854-8. C. 1861-2.
- 1861 WELLS, JOHN SOELBERG, Professor of Ophthalmology in King's College, London, and Ophthalmic Surgeon to King's College Hospital; Assistant-Surgeon to the Royal London Ophthalmic Hospital; 16, Savile row.
- 1854 WELLS, THOMAS SPENCER, Surgeon-in-Ordinary to H.M.'s Household; Surgeon to the Samaritan Free Hospital for Women and Children; 3, Upper Grosvenor street. C. 1870. *Trans.* 8. *Pro.* 1.
- 1842 †WEST, CHARLES, M.D., Physician to the Hospital for Sick Children; 61, Wimpole street, Cavendish square. C. 1855-6. V.P. 1863. *Trans.* 2. *Sci. Com.*
- 1828 WHATLEY, JOHN, M.D.
- 1849 WHITE, JOHN.
- 1852 WIBLIN, JOHN, M.D., Medical Inspector of Emigrants and Recruits; Southampton. *Trans.* 1.
- 1844 WILDBORE, FREDERIC, 245, Hackney road.
- 1870 *WILKIN, JOHN F., Roxby House, Folkestone.
- 1837 WILKS, GEORGE AUGUSTUS FREDERICK, M.D., Stanbury, Torquay.
- 1863 WILKS, SAMUEL, M.D., F.R.S., Physician to, and Lecturer on Medicine at, Guy's Hospital; 77, Grosvenor street, Grosvenor square.
- 1863 WILLETT, ALFRED, Assistant-Surgeon to, and Demonstrator of Practical Surgery at, St. Bartholomew's Hospital; Surgeon to St. Luke's Hospital; 36, Wimpole street, Cavendish square.
- 1864 WILLETT, EDMUND SPARSHALL, M.D., Resident Physician, Wyke House, Isleworth, Middlesex.

Elected

- 1840 †WILLIAMS, CHARLES JAMES BLASIUS, M.D., F.R.S., Consulting Physician to the Hospital for Consumption, Brompton; 49, Upper Brook street, Grosvenor square, C. 1849-50. V.P. 1860-1. *Sci. Com.*
- 1859 *WILLIAMS, CHARLES, Assistant-Surgeon to the Norfolk and Norwich Hospital; 9, Prince of Wales road, Norwich.
- 1866 WILLIAMS, CHARLES THEODORE, M.D., Physician to the Hospital for Consumption, Brompton; 78, Park street, Grosvenor square. *Trans.* 2.
- 1859 WILLIAMS, JOSEPH, M.D. [3, Chichester street, Upper Westbourne terrace.]
- 1868 WILLIAMS, WILLIAM RHYS, M.D., Lecturer on Mental Diseases at St. Thomas's Hospital; Bethlehem Royal Hospital, Lambeth road.
- 1829 WILLIS, ROBERT, M.D., Barnes, Surrey. L. 1838-41.
- 1839 †WILSON, ERASMUS, F.R.S., Professor of Dermatology, Royal College of Surgeons of England; 17, Henrietta street, Cavendish square. *Trans.* 2.
- 1863 WILSON, ROBERT JAMES, F.R.C.P. Edin., 7, Warrior square, St. Leonard's-on-Sea, Sussex.
- 1850 *WISE, ROBERT STANTON, M.D., Consulting Physician to the Southam Eye and Ear Infirmary; Banbury, Oxfordshire.
- 1825 WISE, THOMAS ALEXANDER, M.D., Rostellan Castle, Rostellan, County Cork.
- 1841 WOOD, GEORGE LEIGHTON, 27, Queen square, Bath.
- 1851 WOOD, JOHN, F.R.S., Surgeon to King's College Hospital, and Professor of Surgery in King's College, London; Examiner in Anatomy at the University of London; Examiner in Anatomy and Physiology at the University of Cambridge; 68, Wimpole street. C. 1867-8. *Trans.* 3.
- 1848 WOOD, WILLIAM, M.D., Physician to St. Luke's Hospital for Lunatics; 99, Harley street, Cavendish square. C. 1867-8.

Elected

- 1833 †WORMALD, THOMAS, Consulting Surgeon to St. Bartholomew's Hospital; 42, Bedford row. C. 1839. V.P. 1854.
- 1842 WORTHINGTON, WILLIAM COLLINS, Senior Surgeon to the Lowestoft Infirmary; Lowestoft, Suffolk. *Trans.* 3.
- 1865 WOTTON, HENRY, Jun.; 62, Bedford gardens, Kensington.
- 1860 WYATT, JOHN, Surgeon-Major, Coldstream Guards; Hospital, Vincent square, Westminster; 76, Cadogan place.
-

[It is particularly requested that any change of Title, Appointment, or Residence, may be communicated to the Secretaries before the 1st of October in each year, in order that the List may be made as correct as possible.]

HONORARY FELLOWS.

(Limited to Twelve.)

Elected

- 1853 BRODIE, SIR BENJAMIN COLLINS, Bart., M.A., F.R.S.,
Cowley House, Oxford.
- 1847 CHADWICK, EDWIN, C.B., Corresponding Member of the
Academy of Moral and Political Sciences of the Institute of France.
- 1868 DARWIN, CHARLES, M.A., F.R.S., Corresponding Member
of the Academies of Sciences of Berlin, Stockholm,
Dresden, &c. ; Down, Bromley, Kent.
- 1857 FAER, WILLIAM, M.D., D.C.L., F.R.S., General Register
Office, Somerset House, and Southlands, Bickley,
Kent.
- 1868 HOOKER, JOSEPH DALTON, M.D., D.C.L., LL.D., F.R.S.,
Director of the Royal Botanic Gardens, Kew ; Corresponding
Member of the Academy of Sciences of the Institute of France ;
Royal Gardens, Kew.
- 1868 HUXLEY, THOMAS HENRY, LL.D., F.R.S., Professor of
Natural History in the Royal School of Mines ; Corresponding
Member of the Academies of Sciences of St. Petersburg, Berlin,
Dresden, &c. ; 26, Abbey place, St. John's wood.
- 1868 LYELL, SIR CHARLES, Bart., D.C.L., LL.D., F.R.S., Corresponding
Member of the Academies of Sciences of Paris, Berlin, Philadelphia,
Boston, &c. ; 73, Harley street, Cavendish square.
- 1847 OWEN, RICHARD, D.C.L., LL.D., F.R.S., Superintendent of
the Natural History Departments in the British Museum ; Foreign
Associate of the Academy of Sciences of the Institute of France ;
Sheen Lodge, Mortlake.

Elected

- 1825 SEDGWICK, the Rev. ADAM, A.M., D.C.L., LL.D., F.R.S.,
Woodwardian Professor of Geology, Cambridge.
- 1868 TYNDALL, JOHN, LL.D., F.R.S., Professor of Natural
Philosophy in the Royal Institution; Corresponding
Member of the Academies and Societies of Sciences of
Göttingen, Haarlem, Geneva, &c.; Royal Institution,
Albemarle street, Piccadilly.

FOREIGN HONORARY FELLOWS.

(Limited to Twenty.)

Elected

- 1841 ANDRAL, G., M.D., Member of the Institute and of the Academy of Medicine ; Paris.
- 1862 CRUVEILHIER, JEAN, M.D., Physician to the "Hôpital de la Charité;" Member of the Academy of Medicine ; Paris.
- 1864 DONDERS, FRANZ CORNELIUS, M.D., Professor of Physiology and Ophthalmology at the University of Utrecht.
- 1835 EKSTRÖMER, CARL JOHAN, M.D., C.M., K.P.S., and W., Physician to the King of Sweden ; President of the College of Health, and Director-General of Hospitals ; Stockholm.
- 1841 EHRENBURG, CHRISTIAN GOTTFRIED, Foreign Associate of the Academy of Sciences of the Institute of France, Berlin.
- 1868 GROSS, SAMUEL D., M.D., F.C.P. Philad., D.C.L. Oxon., Professor of Surgery in the Jefferson Medical College of Philadelphia.
- 1866 HANNOVER, ADOLPH, M.D., Professor at Copenhagen.
- 1859 HENLE, J., M.D., Professor of Anatomy at Göttingen.
- 1868 KÖLLIKER, ALBERT, Professor of Anatomy at Würzburg.
- 1856 LANGENBECK, BERNHARD, M.D., Professor of Surgery in the University of Berlin.
- 1868 LARREY, HIPPOLYTE BARON, Member of the Institute ; Inspector of the "Service de Santé Militaire," and Member of the "Conseil de Santé des Armées;" Commander of the Legion of Honour, &c. ; Rue de Lille, 91, Paris.

Elected

- 1843 **LIEBIG, BARON JUSTUS von, M.D.**, Conservator of the Royal Collection, and Professor of Chemistry, in the University of Munich; Foreign Associate of the Academy of Sciences of the Institute of France; Munich.
- 1868 **NÉLATON, AUGUSTE**, Member of the Institute, and of the Academy of Medicine; 1, Avenue d'Antin, Paris.
- 1862 **PIROGOFF, NIKOLAUS, M.D.**, Professor of Surgery to the Medico-Chirurgical Academy in St. Petersburg, and Director of the Anatomical Institute; Consulting Physician to the Hospitals Obuchow, Peter-Paul, and Maria Magdalena; St. Petersburg.
- 1850 **ROKITANSKY, CARL, M.D.**, Curator of the Imperial Pathological Museum, and Professor of the University of Vienna. Referee for Medical and University Education to the Austrian Ministry; Vienna.
- 1856 **STROMEYER, LOUIS, M.D.**, Director-General of the Medical Department of the Army of Hanover; Hanover.
- 1856 **VIRCHOW, RUDOLPH, M.D.**, Professor of Pathological Anatomy in the University of Berlin; Corresponding Member of the Academy of Sciences of the Institute of France; Berlin.



CONTENTS.

	PAGE
List of Officers and Council	v
List of Referees	vii
List of Presidents of the Society	viii
List of Fellows of the Society	ix
List of Honorary ditto	lvi
List of Plates	lxiv
Advertisement	lxv
Regulations relative to "Proceedings"	lxvi

I. A Case of large Biliary Concretion in the Ileum. By F. LE GEOS CLARK, F.R.C.S., F.R.S., Surgeon to St. Thomas's Hospital	1
II. On Ether and Chloroform as Anæsthetics. By J. WAR- BINGTON HAWARD, F.R.C.S., Assistant-Surgeon to the Children's Hospital	5
III. On the Operation of Opening the Larynx by Section of the Cartilages, &c., for the removal of Morbid Growths. By ARTHUR E. DURHAM, F.R.C.S., Sur- geon to, and Lecturer on Anatomy at, Guy's Hos- pital	17
IV. On a Case of Unilateral Atrophy of the Tongue. By WILLIAM FAIRLIE CLARKE, M.A. Oxon., F.R.C.S., Assistant-Surgeon to Charing Cross Hospital, and to the Central London Ophthalmic Hospital	91

	PAGE
V. The Pathology of Scarlatina, and the relation between Enteric and Scarlet Fevers. By JOHN HARLEY, M.D. Lond., late Physician to the London Fever Hospital; Assistant-Physician and Lecturer on Physiology at St. Thomas's Hospital	103
VI. A Case of Complete Recovery after Necrosis of the body of a Cervical Vertebra. By WILLIAM OGLE, M.D. Oxon., F.R.C.P.	139
VII. On the Cerebral Mechanism of Speech and Thought. By WILLIAM HENRY BROADBENT, M.D., F.R.C.P., Physician to, and joint Lecturer on Medicine at, St. Mary's Hospital, and Physician to the London Fever Hospital	145
VIII. On the Surgical Treatment of Suppurating Ovarian Cysts and on Pelvic Adhesions in Ovariectomy. By TIMOTHY HOLMES, F.R.C.S., Surgeon to St. George's Hospital	195
IX. Account of a Case of Resection of the Shoulder and Elbow-joints of the same arm for Gunshot Injury. By WILLIAM MAC CORMAC, F.R.C.S., Assistant-Surgeon to St. Thomas's Hospital	207
X. On a Case of Abdominal Aneurism cured by Compression of the Aorta. By WALTER MOXON, M.D., Assistant-Physician to, and Lecturer on Morbid Anatomy at, Guy's Hospital; and ARTHUR E. DUBHAM, F.R.C.S., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital	213
XI. A Case of Abdominal Aneurism treated by Distal Pressure, with remarks. By THOMAS BRYANT, F.R.C.S., Surgeon to Guy's Hospital	225
XII. On the Effects of Warm Climates in the Treatment of Pulmonary Consumption, as exemplified by an analysis of two hundred and fifty-one cases. By CHARLES THEODORE WILLIAMS, M.D. Oxon., F.R.C.P., Physician to the Hospital for Consumption and Diseases of the Chest, Brompton	233
XIII. An account of some Renal Calculi of unusual shape found in the Left Kidney of a Woman who died of Cancer of the Uterus, &c. By JEREMIAH MCCARTHY, M.R.C.S., Assistant-Surgeon to the London Hospital	263

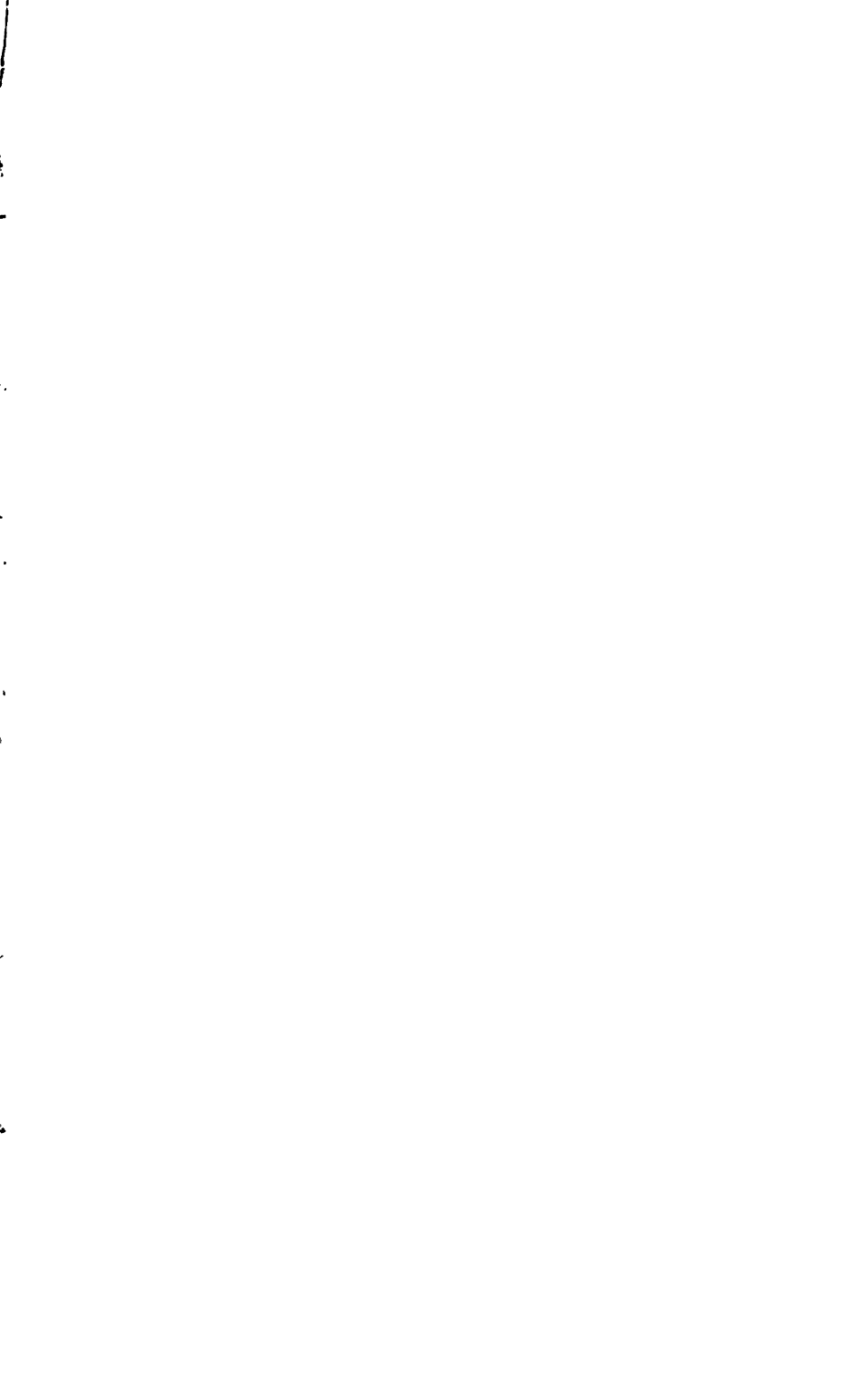
XIV. Account of a Case of Intestinal Obstruction in which an Artificial Anus was made in the Small Intestine ; recovery ; and subsequent death from Cancer and Fatty Degeneration of the Heart. By JEREMIAH MCCARTHY, M.R.C.S., Assistant-Surgeon to the London Hospital	267
XV. On the Pathology of the Morbid State commonly called Chronic Bright's Disease with Contracted Kidney, "Arterio-capillary Fibrosis." By SIR WILLIAM W. GULL, Bart., M.D., D.C.L., F.R.S., Physician-Extraordinary to the Queen ; and HENRY G. SUTTON, M.B., F.R.C.P., Assistant-Physician to, and Lecturer on Pathology at, the London Hospital	273
INDEX	331

LIST OF PLATES.

	PAGE
I. Resection of Shoulder and Elbow-joints (Mr. W. MAC CORMAC)	212
II. Sphygmograms illustrating the effect of Compression of the Abdominal Aorta upon the Pulse at the Wrist, in a case of Abdominal Aneurism (Dr. MOXON and Mr. DURHAM)	224
III. Abdominal Aneurism (Mr. T. BRYANT)	232
IV. Renal Calculi of unusual shape found in the Left Kidney of a Woman (Mr. JEREMIAH MCCARTHY)	266
V. Microscopic Appearances of the Arteries, &c., in Chronic Bright's Disease with Contracted Kidney (Sir W. GULL and Dr. SUTTON)	328
VI. Ditto (ditto)	330

WOODCUTS.

Biliary Concretions from the Ileum (Mr. LE GEOS CLARK)	3
Unilateral Atrophy of the Tongue (Mr. FAIRLIE CLARKE)	93



ADVERTISEMENT.

THE Council of the Royal Medical and Chirurgical Society deems it proper to state that the Society does not hold itself in any way responsible for the statements, reasonings, or opinions set forth in the various papers which, on grounds of general merit, are thought worthy of being published in its Transactions.

REGULATIONS relative to the publication of the "Proceedings of the Society."

That, as a general rule, the Proceedings will be issued every two months, subject to variations dependent on the extent of matter to be printed.

That a Copy of the Proceedings will be sent, postage free, to every Fellow of the Society resident in the United Kingdom.

That "The Proceedings of the Society" may be obtained by non-members at the Society's House, 53, Berners Street, on prepayment of an annual subscription of five shillings, which may be transmitted either by post-office order or in postage-stamps;—this will include the expense of conveyance by post to any part of the United Kingdom; to other places they will be sent, carriage free, through a bookseller, or by post, the receiver paying the foreign charges.

That a notice of every paper will appear in the Proceedings. Authors will be at liberty, on sending their communications, to intimate to the Secretary whether they wish them to appear in the Proceedings *only*, or in the Proceedings and Transactions; and in all cases they will be expected to furnish an Abstract of the communication.

The Abstracts of the papers read will be furnished to the Journals as heretofore.

A CASE
OF
LARGE BILIARY CONCRETION IN THE
ILEUM.

BY
F. LE GROS CLARK, F.R.C.S., F.R.S.,
SURGEON TO ST. THOMAS'S HOSPITAL.

Received June, 1871.—Read October 24th, 1871.

On the 29th of January last I was requested by Dr. King, of Eltham, to visit Mrs. A—, who was suffering from obstinate constipation with vomiting. She was a rather stout woman, fifty-eight years of age, and had generally enjoyed fair health. About eight months previously she had a similar attack of constipation with great pain; and a hard tumour could then be felt in the right hypochondriac region. The existing illness commenced on the 18th of January, eleven days prior to my seeing her: the symptoms were constant bilious vomiting, accompanied by constipation and severe griping pain in the bowels. On the day that I first saw Mrs. A—, the vomiting had become stercoraceous. There was at that time no tenderness of abdomen, no distension nor tympanites. The pulse was quiet, the tongue moist, and the countenance placid. Only fluid nutriment could be taken, and that in small quantity.

Warm water was thrown into the bowels as long as it could be retained, and a small quantity of feculent matter returned with it. An active aperient was then given, with opium; and free friction of the abdomen with castor oil was ordered. Two days subsequently, on July 31st, a scybalous motion was passed, and the stercoraceous vomiting ceased. On February 10th bilious vomiting recommenced and continued until the 18th. From that date till March 11th there was no vomiting, and the bowels acted daily, the motions being of a healthy character. From the beginning of this illness till this date the abdomen could bear pressure; and any pain was relieved by friction with castor oil. The pulse ranged from 80 to 90 in the minute; the tongue was coated, but moist; solid food was not taken except on one occasion.

On March 11th bilious vomiting again recurred, attended with severe abdominal pain, principally in the region of the ileo-cæcal valve, where a hard tumour could be felt, and the belly became tympanitic: the pain was then much increased by pressure or friction. The pulse was rapid, and the tongue coated and dry. Death took place on the 17th, four days subsequent to my second and last visit, and at an interval of eight weeks from the commencement of the illness.

There was no appearance of jaundice throughout this attack; and Mrs. A— had never suffered from jaundice at any previous time.

The post-mortem examination revealed the existence of extensive peritonitis.

Two large gall-stones occupied the ileum, close to the ileo-cæcal valve; and an ulcerated opening in the small intestine had permitted the escape of several small biliary calculi into the sac of the peritoneum. The liver was somewhat larger than natural, but otherwise healthy. The gall-ducts were dilated and thickened. "The gall-bladder did not appear to be altered in character; nor was there any adhesion between it and the duodenum, or anything indicating that the concretions had ulcerated through into the duodenum from the gall-bladder." I quote the words of Dr. King, to whom I am indebted for the history and most of the particulars of

this case, as well as the post-mortem examination which he conducted, but which I did not witness. Each of the large concretions measures about an inch in length and four inches in circumference; and they weigh together nearly an ounce and a quarter. They appear as if moulded to the shape of the ileum.



Mr. Wagstaff, who kindly examined both the larger and smaller specimens for me, reports that they consist of cholesterine only with bile pigment; and that the microscope shows no vegetable matter, nor anything added to the concretion in the intestines. Chemically the concretions yielded 95 per cent. of cholesterine, and five per cent. of animal matter.

I think this case worth recording, on account of the rare size of the concretions, and the singular absence of any proof that they had passed from the gall-bladder to the duodenum by an ulcerated opening through their contiguous surfaces. Yet this is the only conceivable way in which such large bodies would have found their way into the bowel, especially without any attendant symptoms; and the absence of any preceding or accompanying jaundice proves that there could not have been any protracted obstruction to the passage of the bile from the gall-bladder or liver to the duodenum.



ON
ETHER AND CHLOROFORM
AS
ANÆSTHETICS.

BY
J. WARRINGTON HAWARD, F.R.C.S.,
ASSISTANT SURGEON TO THE CHILDREN'S HOSPITAL.

Read October 24th, 1871.

It is sometimes useful to recall attention to neglected, or forgotten remedies or methods of treatment; and it was suggested to me a year ago, by Mr. Thomas Smith, that the statements and practice of American surgeons, and especially of Dr. Bigelow, seemed to show that ether vapour, as an anæsthetic, had been unduly and to our detriment neglected. I therefore commenced some investigations into the subject, and am desirous in this communication to offer some remarks upon the use of ether as an anæsthetic, and also some observations that I have had the opportunity of making upon chloroform, used for the same purpose.

The reason for the almost complete substitution of chloroform for ether, as an anæsthetic in this country, is, I suppose, chiefly the greater potency of chloroform, and the ease and

rapidity with which its effects can be obtained and regulated. But it should be remembered that when chloroform was introduced, the whole subject of anæsthetic inhalation was beginning to be better understood, and that its use was therefore commenced under more favorable auspices than ether; and I cannot but think that its general adoption was in great part due to its having as an advocate, one of the indomitable energy of Dr. Simpson, and from the impression that arose from his first essay on the subject, that chloroform was a safer agent than ether.

I do not myself doubt that chloroform is in some respects more manageable and convenient than ether, but I think there can be no doubt also that it is more dangerous than ether, and that the danger arises much more suddenly, and is of a kind much more difficult to avoid and foresee than in ether. If therefore the administration of ether can be made, as I believe it can, almost as easy as that of chloroform, and if the effects for which we give it are equally well produced, it becomes a question we are bound to consider, how far we are justified, except in special instances such as I will allude to, in resorting to the more dangerous agent.

Moreover ether has some decided advantages over chloroform, besides its greater safety. As to the fact of the greater safety of ether, it is very difficult to obtain any reliable statistics, especially as in this country it is so seldom used. But it is given largely in America and some parts of France, and Dr. Andrews states ('New York Med. Journ.,' June, 1870, p. 443) that in 92,815 cases in which ether was given, in only 4 was it fatal, i.e. 1 in 23,204, the mortality in 117,078 cases of chloroform inhalation being 43, i.e. 1 in 2723. M. Pétrequin of Lyons also states that for the fourteen years that ether has been exclusively given in that city, there has been no death from it ('Brit. Med. Journ.,' March 24, 1866).

Dr. Richardson estimates the deaths from chloroform as 1 in 2500 ('Brit. Med. Journ.,' October 1st, 1870, p. 356).

But there is another mode of estimating the relative danger of these two drugs, more reliable than statistics, that is, a

consideration of their known effects, and of the relation of these effects to the chief dangers to be apprehended.

The committee appointed by this Society to investigate the use and effects of chloroform, report 109 fatal cases. In the 'British Medical Journal' for July 2, 1870, is a table of 18 more cases, and in an appendix to this paper I have given 18 others not included in either of those collections. An examination of these reports reveals two facts:—

1st. That in the majority of fatal cases the mode of death is by failure of the heart's action.

2nd. That this failure is generally sudden. This indeed is, I think, the only kind of death that would take place if the chloroform is given by one accustomed to its administration. For though of course I have often seen the respiration somewhat embarrassed under the inhalation of both chloroform and ether, I have never seen any real danger except from failure of the heart's action. In some of these cases I believe the effect on the heart has been produced by the shock of the operation, or by loss of blood; but in others it could be fairly attributed to nothing save the effect of the chloroform. In two cases of amputation at the hip-joint, for instance, I have seen the patient in great danger from failure of the heart's action, but in both of these, the failure of the pulse was coincident with the removal of the limb. In the following case, however, the danger which arose could only be attributed to the chloroform, and as it seems to me typical of most of the dangerous or fatal cases, I here briefly relate it. The patient was a man aged 42 years, rather pale, but not in particularly weak health; I had thrice before given him chloroform; for the removal of a testicle, for amputation of the forearm, and for examination of the stump. On May 19th, 1871, I again gave him chloroform, using the modified Snow's inhaler. He had become insensible, and Mr. Holmes was proceeding to remove the carious end of the radius. I had removed the inhaler from his face for a short time, he was beginning to recover consciousness slightly, and the reflex sensibility of the eyelids had returned. I again applied the inhaler, which could not have contained more than half a

drachm of chloroform, probably less; he then struggled slightly for about two minutes, and was becoming quiet, when his pulse suddenly stopped, without the slightest previous indication of failure. I instantly withdrew the inhaler and drew out the tongue; the respiration became very shallow and his face very livid, indeed, he was most nearly dead. Artificial respiration was at once resorted to, and after about three minutes, the pulse could be felt and he began to rally; the operation was proceeded with, and he recovered. This man had a regular, and rather weak pulse, and no discoverable heart disease. Having given chloroform to persons with extensive heart disease, and being accustomed to watch carefully the pulse as well as respiration, I can confidently state that, in this case, there was not the slightest indication of the approaching danger; the pulse ceased suddenly, and the patient was in a moment transferred from an apparently safe condition to one of the gravest danger.

The chief danger, then, from chloroform is a sudden arrest of the heart's action, and this danger does not pertain to ether. For it has been shown by Dr. Snow ('Anæsthetics,' p. 362) that it is impossible to paralyse the heart by ether inhalation; and the Chloroform Committee of this Society report that "its (ether) vapour may be regarded in a certain degree as a stimulant to the force of the heart's action" ('Med.-Chir. Trans.,' vol. xlvii, p. 335); and that the pressure in the vessels is maintained until there has been a manifest failure of the breathing (ibid.). The Committee also state (ib., pp. 346-7) that "the simple failure of respiration, whilst the circulation remains good, almost always betokens a recoverable condition," but that "the failure of the circulation to any considerable extent always involves extreme peril;" and "after the heart has stopped, recovery is but just possible, and is by no means the usual result of attempts to resuscitate."

In the 97 cases in which I have given ether, I have uniformly found the pulse increased in volume, and the improvement maintained during the inhalation. On one occasion I gave ether to an old man of seventy-two, who

had paralysis, from degeneration of the spinal cord, a very feeble heart, chronic bronchitis, and symptoms of uræmic poisoning. The operation of perineal section was performed while he was under the influence of ether, and the pulse was certainly stronger after, than before the operation.

Ether, therefore, has the advantage of being antagonistic to the effect of the shock of an operation.

Another advantage, I believe, of ether (though on this I speak less confidently for want of more extended experience) is that it is less liable to produce after-sickness than chloroform. It is necessary here to distinguish between the immediate, and the after-sickness produced by these vapours. If the stomach contains food, the inhalation of either ether or chloroform vapour will be equally liable to empty it. But chloroform sometimes produces a persistent vomiting, which comes on after its inhalation is finished, and which may cause even dangerous exhaustion. I do not think ether will cause this. In none of the cases in which I have given it has there been any after-sickness in this sense of the word. To one child I gave it, in whom chloroform had twice produced after-sickness; but the ether had no such effect.

The chief objection that has been made to ether is the greater quantity, and therefore longer time, required to render a person insensible. This does not appear to me a very powerful objection; and, moreover, by attention to a few simple matters to which I will allude, insensibility can be produced almost as rapidly as by chloroform.

Of course, when ether is evaporated from any surface, the temperature of the surface is soon so much reduced as to materially interfere with its conversion into vapour. To obviate this, Dr. Snow kept his inhaler in a quantity of water, which was somewhat inconvenient. When I first began to give ether I therefore had two bell-shaped sponges, one of which was kept in hot water, while the other was used for the evaporation of the fluid; and these were changed when the temperature became sufficiently reduced to need it. But sponge is not a convenient material

for the purpose, because it absorbs a large part of the ether, and gives it off from its outer surface; and, moreover, the ether is apt to gravitate to its lower part, and to run on to the patient's face, producing unpleasant cold or even blistering.

I have found the most convenient form of inhaler to be a cone of felt, covered with oiled silk or macintosh, into the upper part of which is fitted a piece of sponge, which can be changed occasionally for a similar piece kept in a basin of warm water. A shallow gutter running round the inside of the cone prevents the ether reaching the patient's face. An aperture, the size of which can be regulated by the finger, admits more or less air, as may be required.

By whatever kind of apparatus ether is administered, the principle of administration should be—

1. To scatter the ether on to a surface which allows its evaporation, without much absorption.

2. When the temperature of this surface is so much reduced that the ether is too slowly evaporated, to change it for a warm one.

3. To give the vapour freely at first, so as to bring the patient under its influence as quickly as possible, by which the tendency to struggling is lessened.

The two greatest inconveniences that I have myself found to pertain to ether are, the unpleasantly noisy excitement sometimes manifested when the patient is recovering from its influence; and the rapid diffusion of the vapour about the room, which is, to some, disagreeable. The easy inflammation of the vapour must also be borne in mind.

I first gave ether on September 8th, 1870, at the suggestion of Mr. T. Smith, to a child, aged 3 years, in whom Mr. Smith closed a cleft in the hard and soft palate, while the child was under its influence. There was no difficulty in keeping the child completely insensible, which was done for fifty-five minutes. Two fluid ounces of the washed methylated ether was consumed. The child vomited a little swallowed blood at the time of the operation, but there was no after-sickness. I used the sponges for evaporating it.

In two other cases, of the ages of nine and sixteen, I failed in keeping the patient quiet for a sufficient time after the withdrawal of the sponge from the face. This was, I believe, because I did not produce a sufficiently deep narcotism, and as ether when given on a sponge takes rather longer than chloroform to produce this, excepting in young children, it is not, I think, so well adapted as the latter, for operations upon the mouth where it requires to be readministered at intervals, as quickly as possible, and when, from hæmorrhage or other reasons, an inhaler cannot be used. I have, however, given it in six cases for the operation of cleft palate (in all of which, of course, Mr. Smith's gag was used), and in nine cases for other operations on the mouth, as puncturing the antrum, &c.; for excision of the elbow; circumcision; lithotrity; lithotomy; the application of nitric acid; straightening contracted joints; perineal section; ligature of piles; amputations, opening and examining joints; plastic operations; iridectomy; removal of dead bone; removal of toenails, and other operations, in all without any bad symptoms (*vide* Appendix II).

I think it the more desirable to use an anæsthetic which has a stimulant, rather than a depressing, effect upon the heart, because I am convinced that anæsthetics do not so much lessen the shock of operations as has been by some asserted. Mr. Lister, in his article on "Anæsthetics," in 'Holmes' System of Surgery' (vol. iii, p. 98), goes so far as to say that both faintness and shock during an operation are got rid of by chloroform; and that an amputation under chloroform often improves the pulse. He also advises (*ib.*, p. 105) the administrator of chloroform to disregard the pulse altogether. Great as is my respect for Mr. Lister's opinion, I feel bound to disagree with him on these points. I have given chloroform to more than 1300 persons, varying from three days to 78 years of age, and for almost every kind of operation, and have always carefully watched both pulse and respiration; and have noticed almost invariably that the effect of any severe surgical operation has been to rapidly and markedly depress the heart's action. It is necessary to

explain that I here speak of the pulse as it beats when the patient is fully narcotised. I fully believe in chloroform overcoming the effect of emotional depression; the pulse of a person is increased in rapidity, and lessened in force, by the fear and anticipation both of the operation and the anæsthetic; and, as he becomes unconscious, the pulse improves, owing to the departure of fear with the occurrence of insensibility; but if we make the condition of pulse now present, our standard of comparison, I am confident that it is greatly and sometimes dangerously depressed by the shock of an operation. Besides this, I have not unfrequently had indications of danger from the pulse, which could not have been obtained from the respiration. I cannot, therefore, agree with Mr. Lister's advice to disregard this index.

It has been said that one great advantage of anæsthetics, is the mental tranquillity with which a person is enabled to regard the prospect of an operation which is to be robbed of its pain; but I am not sure that this is not often counter-balanced by the dread of an anæsthetic which it is known may of itself prove fatal. It seems to me, therefore, that for this, as for the other reasons I have herein advanced, we should, if possible, avail ourselves of an anæsthetic so safe as ether appears to be, rather than of one, however much it has to recommend it, to which is attached the danger which unquestionably pertains to chloroform.

APPENDIX I.

Fatal cases of chloroform inhalation.

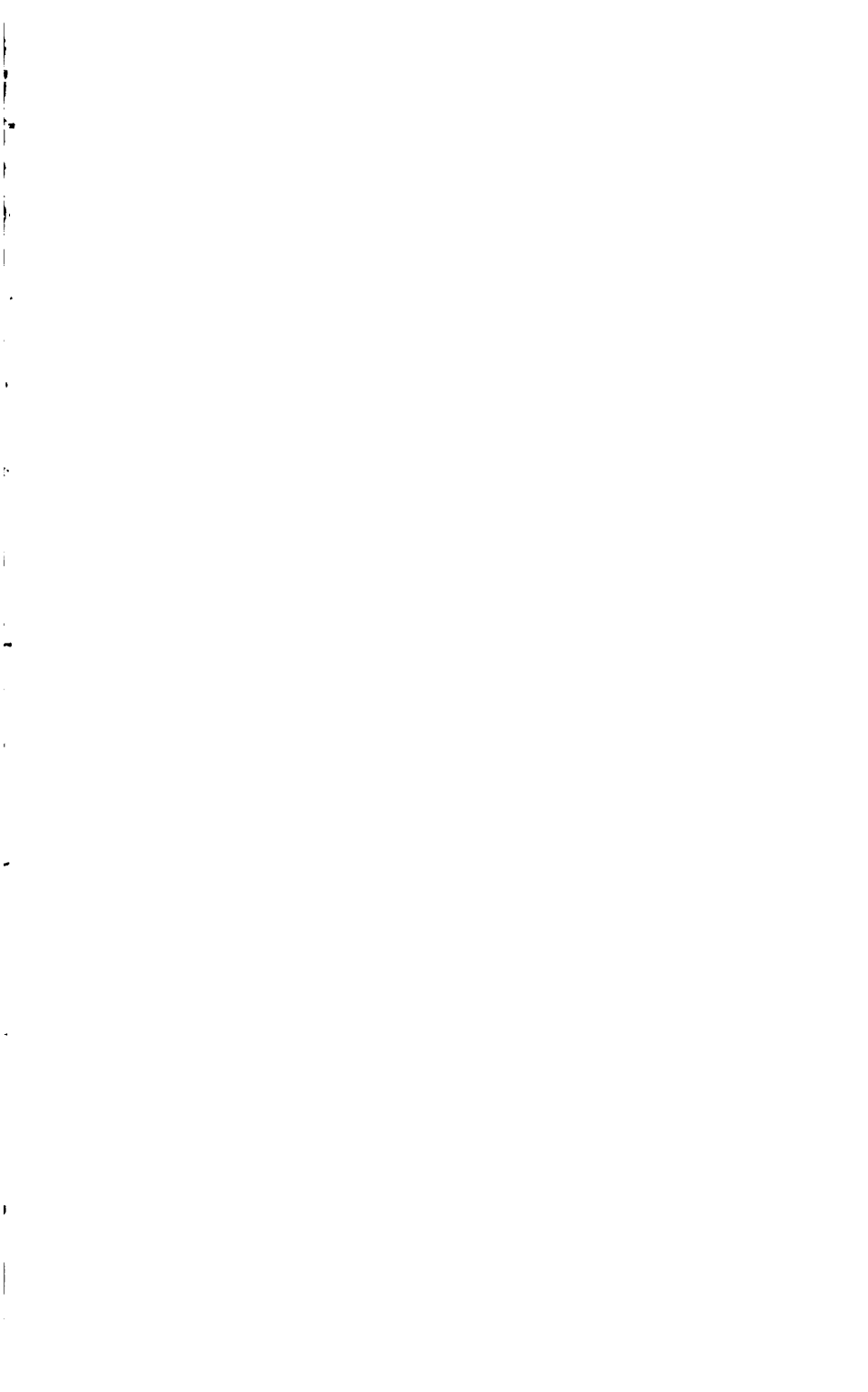
No.	Date, authority, sex, age.	Nature of operation.	Mode of administration.	Mode of death.
1	Brit. Med. Journ., June 3, 1865; Ophthalmic Hospital, Bloomfield Street; male, æt. 13.	Not stated.	Not stated.	Syncope.
2	Brit. Med. Journ., June 24, 1865; Liverpool; child, æt. 2.	Amputation of finger.	On lint; thirty drops given.	Not stated; "died in five minutes."
3	Brit. Med. Journ., March 2, 1867; St. Mary's Hospital; male.	Reduction of dislocation of thumb.	Clover's apparatus; three or four minutes.	Paralysis of heart.
4	Brit. Med. Journ., July 13, 1867; Manchester Eye Hospital; male, æt. 8.	For strabismus.	Not stated.	Not stated.
5	Brit. Med. Journ., September 7, 1867; New York; male, æt. 35.	Not stated.	On a towel.	Not stated; "spasm in second stage of narcotism."
6	Brit. Med. Journ., May 9, 1868; Northern Hospital, Liverpool.	Not stated.	Not stated.	Syncope.
7	Brit. Med. Journ., June 13, 1868; Vienna; male, æt. 26.	Ligature of arteries in wound of hand.	Not stated.	Heart stopped before respiration.
8	Brit. Med. Journ., June 13, 1868; Hants County Hospital; male, æt. 54.	Ligature of piles.	On lint; patient on left side.	Heart and respiration ceased together.
9	Brit. Med. Journ., July 25, 1868; Warley Lunatic Asylum; male, æt. 28.	Amputation of finger.	On handkerchief; three doses of twenty minims each.	Heart paralysed; tubercle at base of brain; heart and liver fatty.
10	Brit. Med. Journ., March 25, 1871; Salop Infirmary; male.	For fistula.	On lint; patient turned on to left side; three and a half drachms used.	Paralysis of heart; organs healthy; much fat everywhere.

No.	Date, authority, sex, age.	Nature of operation.	Mode of administration.	Mode of death.
11	Brit. Med. Journ., April 29, 1871; Swansea; male, 47.	Amputation of leg.	On lint; three drachms used.	Failure of heart and respiration.
12	Brit. Med. Journ., April 22, 1871; Wilmslow, Cheshire; male.	Forcible extension of knee.	Not stated.	Not stated; it had often been taken before.
13	Edinb. Med. Journ., May, 1871; Edinburgh Infirmary; male, æt. 42.	To reduce dislocation of humerus.	Not stated.	Paralysis of heart; "fatty degeneration."

APPENDIX II.

Table of cases of ether inhalation.

No.	Nature of operation.	Sex.	Age.	If after sickness.
1	Staphyloraphy.	F.	3	No.
2	Ditto.	F.	16	No.
3	Ditto.	M.	9	No.
4	Ditto.	F.	3	No.
5	Ditto.	F.	15	No.
6	Ditto.	F.	14	No.
7	Removing stitches from palate.	F.	3	No.
8	Ditto.	F.	3	No.
9	Ditto.	F.	4	No.
10	Amputation of thigh.	M.	68	No.
11	" of fingers.	M.	8	No.
12	" of fingers.	M.	30	No.
13	" of foot.	F.	24	No.
14	Excision of elbow.	F.	9	No.
15	Removal of dead bone.	M.	3	No.
16	Ditto.	M.	11	No.
17	Ditto.	M.	6	No.
18	Ditto.	M.	10	No.
19	Ditto.	M.	6	No.
20	Ditto.	M.	7	No.
21	Ditto.	M.	8	No.
22	Ditto.	M.	7	No.
23	Ditto.	M.	8	No.
24	Ditto.	F.	14	No.
25	Ditto.	F.	10	No.
26	Ditto.	M.	19	No.
27	Ditto.	M.	6	No.





No.	Nature of operation.	Sex.	Age.	If after sickness.
28	Removal of dead bone.	M.	8	No.
29	Ditto.	F.	12	No.
30	Ditto.	M.	9	No.
31	Incisions for periostitis of tibia.	M.	17	No.
32	Applying nitric acid to leg.	F.	30	No.
33	Ditto.	F.	30	No.
34	Laying open the knee-joint.	F.	20	No.
35	Ditto.	M.	8	No.
36	Ditto.	M.	7	No.
37	Ditto.	M.	8	No.
38	Ditto.	F.	17	No.
39	Laying open the hip-joint.	F.	10	No.
40	Ditto.	F.	7	No.
41	Opening abscess.	F.	10	No.
42	Ditto.	F.	7	No.
43	Ditto.	M.	8	No.
44	Ditto.	M.	10	No.
45	Ditto.	F.	10	No.
46	Ditto.	M.	9	No.
47	Straightening hip-joint.	M.	16	No.
48	" knee-joint.	F.	4	No.
49	Flexing elbow.	F.	11	No.
50	Tenotomy.	F.	11	No.
51	Ditto.	F.	3	No.
52	Ditto.	F.	6	No.
53	Ditto.	F.	7	No.
54	Avulsion of toenail.	M.	14	No.
55	Ditto.	F.	19	No.
56	Circumcision.	M.	2	No.
57	Ditto.	M.	2	No.
58	Ditto.	M.	11	No.
59	Ditto.	M.	10	No.
60	Ditto.	M.	5	No.
61	Ditto.	M.	6	No.
62	Ditto.	M.	7	No.
63	Sounding for stone.	M.	4	No.
64	Ditto.	M.	10	No.
65	Lithotrity.	M.	50	No.
66	Lithotomy.	M.	3	No.
67	Removal of tumour of foot.	F.	15	No.
68	Puncturing antrum.	M.	6	No.
69	Ditto.	M.	6	No.
70	Syringing antrum.	M.	6	No.
71	Ditto.	M.	6	No.
72	Extraction of teeth.	F.	9	No.
73	Ditto.	F.	7	No.
74	Ditto.	M.	6	No.
75	Laying opening sinus.	F.	11	No.
76	Applying caustic to eyelid.	F.	3	No.
77	Ditto.	F.	3	No.
78	Ditto.	F.	3	No.
79	Examining eyes in strumous ophthalmia.	F.	3	No.

No.	Nature of operation.	Sex.	Age.	If after sickness.
80	Iridectomy.	M.	8	No.
81	Removal of needle from knee.	F.	20	No.
82	Removal of foreign body from ear.	M.	4	No.
83	Eustachian catheterisation.	M.	4	No.
84	Removal of enlarged tonsils.	M.	6	No.
85	" of condylomata.	F.	24	No.
86	Ligature of piles.	F.	28	No.
87	Division of fissure of anus and ligature of polypus.	F.	30?	No.
88	Plastic operation.	M.	6	No.
89	Ditto.	M.	7	No.
90	Ditto.	M.	6	No.
91	Ditto.	M.	8	No.
92	Ditto.	F.	11	No.
93	Ditto.	F.	5	No.
94	Ditto.	F.	6	No.
95	Perineal section.	M.	72	No.
96	For closing recto-vaginal fistula.	F.	30	Vomited once an hour after operation.
97	Closing vesico-vaginal fistula.	F.	81	No.

ON THE
OPERATION OF OPENING THE LARYNX
BY
SECTION OF THE CARTILAGES, ETC.,
FOR THE
REMOVAL OF MORBID GROWTHS.

BY
ARTHUR E. DURHAM, F.R.C.S.,
SURGEON TO, AND LECTURER ON ANATOMY AT, GUY'S HOSPITAL.

Received November 10th.—Read November 14th, 1871.

THE operation of opening the larynx by section of the cartilages, as well as of the soft parts, in order to facilitate the removal of morbid growths and foreign bodies is by no means a new one. It was suggested, clearly described, and strongly recommended by Desault some hundred years ago; and indeed it is still sometimes spoken of as "Desault's operation." It does not appear, however, to have been ever actually practised by that distinguished surgeon. But of late years—and especially since the use of the laryngoscope has rendered the diagnosis of laryngeal affections comparatively easy and certain—it has been repeatedly performed in this country,

and somewhat more frequently abroad. Nevertheless, so far as I am able to judge, the merits of this method of proceeding are, as yet, neither so generally recognised, nor so highly appreciated as it seems to me they deserve to be; while on the other hand the difficulties and dangers involved are very commonly and very greatly over-estimated.

I therefore venture to submit to the consideration of the Fellows of the Royal Medical and Chirurgical Society on the present occasion the following details of five cases in which this operation has been performed for the removal of morbid growths either by myself, or by one of my colleagues, at Guy's Hospital. And I would at once express my thanks to Mr. Bryant and Mr. Davies-Colley for their kind permission to include the particulars of their cases with mine in this communication. I also venture to submit a few general remarks and conclusions suggested by these cases, considered in conjunction with the various other cases that I have been able to find on record, in which, with like purpose, similar operations have been performed.

CASE I.—The details of my first case have already been published *in extenso* in the volume of the 'Guy's Hospital Reports' for the year 1866. I therefore simply recapitulate the more important particulars.

Mary F— was first admitted into Guy's Hospital in August, 1862, when she was about nine years of age. She was suffering from such urgent dyspnœa that tracheotomy was performed by the then house surgeon, Mr. Holmsted, within a few hours of her admission.

The history given was to the effect that the patient had been for a long time subject to attacks of "sore throat" and "loss of voice;" and that the last attack, which had come on some weeks previously to her admission, had never subsided, but the symptoms had gradually increased in severity until she was scarcely able to breathe or to swallow. At the end of about seven weeks she left the hospital comparatively well in health, but wearing the tracheotomy canula, and quite unable to utter a sound or to breathe through her larynx.

In the course of the next four years she was readmitted to the hospital under my care no fewer than eleven times, and on each occasion she remained in some two or three weeks, or more. The most persevering attempts were made from time to time to obtain a view of the interior of the larynx. But the extreme sensitiveness of the parts, and the obstinate resistance of the patient defeated all such attempts until during her last stay in the Hospital. In July, 1866, I succeeded in seeing quite distinctly a considerable warty growth on the left false vocal cord, and in making out, though somewhat less positively, that the whole of the larynx was blocked up by similar growths.

On 27th of July, chloroform having been administered through the tracheotomy canula, I passed a small curved sharp-pointed knife straight through the superficial structures, the crico-thyroid membrane and the mucous membrane of the larynx, and cut directly upwards in the middle line through the thyroid cartilage, &c., thus dividing all the structures by one incision as high as the thyro-hyoid membrane, which was only slightly cut. The cricoid cartilage was subsequently divided in order to give more room. Some hæmorrhage and somewhat severe spasmodic cough followed the first incision. When these had subsided (which they did very speedily), and the lips of the wound were drawn apart, it was at once seen that the whole cavity of the larynx was stuffed with warty growths varying in size and precise situation. The largest was that already mentioned as seen by aid of the laryngoscope on the left false vocal cord. There were none, or only two or three minute ones, *below* the true vocal cords; but with this exception, the mucous membrane of almost every part of the interior of the larynx was covered with them. All were carefully removed; some were cut off with scissors, others were twisted off with forceps. The slight bleeding which ensued was easily arrested by free exposure to the air, and temporary pressure by means of sponges. The wound was closed by sutures and strapping. The tracheotomy canula which had not been in any way interfered with during the operation was left *in situ*.

The next day the patient could breathe through the larynx, and could produce audible sounds.

On the seventh day after the operation the recent wound had entirely healed. On the 10th day the tracheotomy canula was removed, after having been continuously worn for just four years. The opening very speedily closed up; and on 22nd August, not quite a month after the operation, the patient left the Hospital in excellent health, breathing easily and well, and able to speak quite audibly.

I last saw her about a year ago, more than four years after the operation. She had grown into a fine thoroughly healthy young woman, breathing and speaking as though she had never had anything the matter with her larynx. Her mother said of her "You might hear her singing from the top of the house to the bottom."

Laryngoscopic examination showed no indications of any return of the growth.

CASE II.—James G—, aged 7 years, was admitted into Guy's Hospital under my care on the 27th July, 1870. From the time when he was about two years old he had suffered more or less constantly from difficulty of breathing and loss of voice. These symptoms increasing in severity he was placed under the treatment of my friend Dr. Carey (of Guernsey), who after a time found it necessary to perform tracheotomy in order to rescue the patient from impending suffocation. The operation was performed when the child was between three and four years old, and was entirely successful in relieving him from his previous state of suffering and danger. His voice, however, was entirely lost. Many ineffectual efforts were made from time to time to obtain a view of the interior of the larynx by aid of the laryngoscope; and various methods of treatment were tried, but without any good result. He continued to wear the tracheal canula during the next three or four years, being quite unable to breathe through the natural passage. At the end of that time he was brought to me by Dr. Carey, and admitted as before-said into Guy's Hospital under my care. The history of the

case and the symptoms presented, viz. absolute inability to breathe through the larynx, and total loss of voice without obvious swelling or pain, or other indications of local inflammatory mischief, at once suggested the probable existence of warty growths in the larynx. This diagnosis after a number of futile attempts was at length confirmed by laryngoscopic and digital examination.

On the 30th August, chloroform having been administered, I made an incision along the middle line through the skin and superficial structures on to the laryngeal cartilages and upper rings of the trachea, and then gradually cut through the cartilages and mucous membrane from above downwards as low as the existing opening in the trachea. A mass of warty growths at once became projected between the borders of the incision, and on separating the divided edges the whole cavity of the larynx was seen to be filled by similar growths. The mucous membrane covering the vocal cords, true and false, as well as that lining the ventricles, and the part of the larynx below the true vocal cords, was everywhere studded with these growths, some forming more or less considerable masses, and others almost isolated and very small. All were carefully and completely removed by means of scissors, or dressing forceps, or wiped off by the sponges which were freely used. Nitrate of silver was then applied to the surface generally, and especially to all bleeding points. The slight hæmorrhage that occurred was speedily and easily arrested; and the spasmodic cough, which had been at first excited, soon subsided. The tracheal canula was readjusted and fixed in position, and the part of the wound above it was closed by sutures and sticking-plaster. The patient passed a good night. The next day he was free from pain in the parts operated upon, but complained of some soreness about the chest. He was able to breathe through the larynx when the orifice of the tracheal canula was closed.

In the course of the following few days a slight attack of bronchitis supervened; but this speedily yielded to treatment, and no serious symptom presented itself.

On the eighth day after the operation the sutures were

removed, and the wound was found to be entirely healed almost as far down as the situation of the tracheal canula. The patient could breathe quite freely through the larynx, and could speak in an audible whisper. The tracheal canula was ordered to be kept constantly closed during the daytime by means of a gutta-percha plug, which could be at once taken out in case of need.

Three weeks after the operation the tracheal canula was finally removed, and the borders of the opening, in which it had been so long worn, were brought together by means of sticking-plaister.

The patient steadily improved in health and strength, and gradually regained his voice. It became a standing amusement with the other patients in the ward to teach him to sing. This he did in a very amusing way, but in a key preternaturally low for a boy of his age.

The opening into the trachea contracted to a certain extent and then remained for a long time unchanged in appearance, showing no disposition to close up altogether, but assuming the aspect of a permanent fistula. It was kept constantly covered by layers of plaister so that no air could pass through, and nitrate of silver was frequently applied. Such means proving useless, three months after the operation I pared the edges of the opening and fixed the fresh surfaces in contact by means of sutures. It was necessary, however, to repeat this proceeding before the opening could be made to close finally and entirely.

The patient left the Hospital quite well on the 22nd February of the present year (1871).

I last heard of him some nine months after the operation. His parents reported that he was somewhat "delicate in general health," but that "he breathed perfectly well," and that "they were quite satisfied with the condition of his voice."

CASE III.—Ellen A—, 8 years of age, was admitted into Guy's Hospital under my care on the 10th August, 1870. Before she was two years old she became hoarse soon after a

very severe attack of whooping-cough. The hoarseness remained persistent and gradually increased in severity. After a time she lost her voice, and began to suffer from difficulty of breathing.

In the year 1866, when about four years old, she was admitted into Guy's Hospital under my care; and I performed tracheotomy upon her on account of the urgent dyspnoea from which she was suffering, it being at that time impossible to ascertain precisely the cause of her symptoms. She was at once relieved, and after a time left the Hospital breathing freely through the canula, but quite unable to breathe through the larynx, or to utter an audible sound. I saw and examined her from time to time, and after several attempts distinctly recognised the presence of warty growths partially filling the larynx and apparently springing from the false vocal cords; further I could not see. The parents, however, refused to have any further operation performed, and they persisted in their refusal until the period of her second admission to the Hospital. At that time it seemed to me on laryngoscopic examination that the growths were fewer and relatively smaller than when I had previously seen them. Moreover she could breathe to some extent through the larynx when the orifice of the tracheal canula was closed, but she remained absolutely voiceless.

On the 18th October, chloroform having been administered, I proceeded to operate in the same manner as in the case just described. There were some eight or ten small warty growths scattered over the true and false vocal cords, and also two or three minute ones in each ventricle. These were removed as in the former cases, and nitrate of silver was freely applied. The wound was then closed by sutures as far down as the opening for the tracheal canula, which was readjusted and fixed in position. There was but little bleeding and the spasmodic cough excited soon subsided.

The patient progressed very favorably, though for the first two or three days she suffered from frequent and trying cough.

On the fifth day the stitches were removed, the wound being

healed almost as far down as the tracheal opening. The patient could breathe freely through the larynx.

In less than three weeks after the operation she could speak audibly, and the tracheal canula was removed and plaister applied over the opening. In this case, however, as in the preceding one, it was necessary to pare the edges and apply sutures before the fistulous opening leading into the trachea could be made to close. This result, however, was finally accomplished, and the patient left the hospital between five and six months after the operation in excellent health, breathing perfectly well, and speaking in a clear and distinct though rather feeble voice. I have not seen her since, but her parents would have been certain to have brought her to me if there had been the slightest recurrence of unfavorable symptoms. When I last examined her by aid of the laryngoscope no abnormal appearances were presented.

CASE IV.—Alfred T—, aged 3 years, was admitted into Guy's Hospital under the care of Mr. Bryant, on the 24th September, 1870. Sixteen months previously the patient became hoarse, and in the course of two months entirely lost his voice. He soon began to suffer from difficulty of breathing, which gradually increased in severity until the period of his admission. On external examination some slight swelling about the larynx could be perceived.

On the 11th October, chloroform having been administered, Mr. Bryant made an incision through the soft parts along the median line of the neck, opened the trachea, and inserted a canula. He next by means of a curved bistoury cut upwards from the opening in the trachea, and divided in succession from within outwards the cricoid cartilage, the cricothyroid membrane, and the thyroid cartilage together with the mucous membrane of the larynx. The thyro-hyoid membrane was afterwards partially divided. There was some brisk hæmorrhage which, however, was speedily arrested by the torsion of two or three vessels and the application of pressure. When the divided parts were held asunder numerous warty growths, varying in size and situation, were seen scattered over

the surface of the mucous membrane of the larynx. These were removed by scissors or forceps, or detached by the finger nail and sponged away. The whole surface of the mucous membrane was then freely mopped over with a solution of perchloride of iron. The tracheal canula was tied in, and the wound closed above it by sutures. Two or three attacks of severe difficulty of breathing, with lividity of countenance, occurred in the course of the operation; but these were soon recovered from, and at the close the patient was in fairly comfortable condition.

The after progress was most satisfactory. By the end of a week the child could make himself understood very well, speaking in a kind of whisper. For a few days there was some considerable muco-purulent discharge through the canula.

In the course of a fortnight the canula was removed, and by the end of three weeks the wound was entirely healed. Breathing was perfectly easy, and the voice was improving. He left the Hospital well on the 3rd November of last year.

Mr. Bryant informs me that he heard an excellent account of the patient about a fortnight ago; that is, rather more than a year since the operation. He was "in perfect health, eating, drinking, breathing and speaking just like any other child."

CASE V.—Alfred M—, 4 years of age, was admitted into Guy's Hospital under the care of Dr. Pye-Smith on the 26th June, 1871. He subsequently came under the care of Mr. Davies-Colley.

The patient was said to have caught cold eighteen months before admission. His voice became husky, and his breathing less free than natural. The symptoms gradually increased in severity, and during the last three months he had entirely lost his voice.

On admission the child was found to be suffering severely from dyspnoea. His face was anxious, his lips were blue, and his eyes prominent. His respiration was quick and harsh;

his arms were held back, and all the intercostal spaces were drawn in during inspiration.

On the 2nd day after admission, suffocation seeming imminent, Mr. Colley performed tracheotomy. Relief from all the urgent symptoms was at once obtained. The child speedily recovered from the immediate effects of the operation, as well as from his previous state of suffering. It was found, however, that he could not breathe at all through the larynx, or only to a very slight extent. The attempt to make him do so was followed by severe dyspnoea. Digital examination confirmed the opinion expressed that the obstruction was due to the presence of some morbid growth in the larynx.

On the 3rd August, chloroform having been administered, Mr. Colley exposed the larynx along the middle line, and then (all bleeding having been arrested) cut through in succession the thyroid cartilage and crico-thyroid membrane. It was subsequently found necessary to divide the cricoid cartilage and also the upper rings of the trachea. A large number of warty growths were then removed by means of scissors and forceps. These growths varied in size and position; they were irregularly scattered over the whole internal surface of the larynx; some were above the false vocal cords; some on the base of the epiglottis, others on the vocal cords and in the ventricles, and others, again, as low down even as the opening made for the tracheal canula. The true vocal cords could scarcely be distinctly recognised; and in no part did the mucous membrane present a natural appearance. Nitrate of silver was freely applied. The tracheal canula was then fixed in position, and the wound above it closed by sutures.

For some time the case progressed very favorably, the wound healed down to the tracheal canula, and the child could breathe freely when the orifice of the canula was closed. He was also able to speak plainly enough in a somewhat husky loud whispering voice. A month after the operation the tube was removed. The child did very well during the day time; but at night it was found necessary to replace the tube. A similar experiment was tried a month later, and with like result.

On laryngoscopic examination a roundish swelling of or from the mucous membrane covering the right arytenoid cartilage could be distinctly seen. The general cavity of the larynx could not be brought into view. It was believed that the swelling alluded to was inflammatory in origin, and that under treatment it might perhaps subside.

Latterly the voice has become less distinct than it was, and the child is again unable to breathe freely when the orifice of the trachea canula is closed. It would appear not improbable that a recurrence of the growth is taking place.

This case must be regarded as incomplete and still under treatment. But I have thought it well to detail the history so far, inasmuch as it serves, at any rate, to show, in conjunction with the preceding cases, that the operation itself and its immediate results may be regarded as comparatively free from danger.

ADDENDUM, June, 1872.—The further progress of this case has been as follows. The child continued well in health, but his voice became less and less distinct, and after a time he was altogether unable to breathe when the orifice of the tracheal canula was closed. On examination (laryngoscopic and digital) it became manifest that a fresh crop of warty growths had sprung up. Under these circumstances a repetition of the operation was decided upon. Accordingly on the 3rd March of the present year (1872), chloroform having been administered through the canula, and the canula having been removed, Mr. Colley passed a curved director through the tracheal opening, and upwards through the glottis. He then by means of a curved bistoury laid open the larynx along the middle line by a single incision which was carried as far upwards as the hyoid bone. On separating the divided parts a great number of warty growths, studding the surface of the mucous membrane, were brought into view. They were removed and nitrate of silver freely applied as in the previous operation. The tracheal canula was replaced, and the portion of the wound above it closed by sutures &c. All went on

well ; a fortnight or so after the operation the child was running about the ward and able to breathe freely through the larynx. On the 20th March Mr. Colley removed the canula. No inconvenience resulted. The wound rapidly closed, and on the 4th April the patient was discharged in excellent health breathing freely through the larynx, and able to speak audibly, though by no means in a natural voice.

Appended to the present communication are condensed but more or less complete reports of all the cases I have been able to find on record in which the laryngeal cartilages have been divided in order to facilitate the removal of morbid growths. These cases are thirty-two in number, and with the five related above give a total of thirty-seven.¹ In at least nineteen of these the result of the operation may fairly I think be regarded as having been *completely successful*, natural respiration and voice having been restored in each, although in some few the voice is stated to have remained harsh or low in tone. In seven the result may be considered to have been *partially successful*, natural respiration having been restored, but the voice having remained extinct or at best reduced to a hoarse whisper.

In four cases some degree of *temporary benefit* resulted ; but in all of these the growth was of cancerous nature, and either was not completely removed or soon recurred.

¹ Since this paper was read Mr. Henry Lee has kindly favoured me with the particulars of a case in which he operated upon a patient admitted into St. George's Hospital, under the care of Dr. J. W. Ogle, who has been so good as to supply the early history. The result was very satisfactory, natural respiration having been restored, and the voice regained, although at the last observation it was still "croaking." M. Demons, of Bordeaux, has informed me that a similar case has come under his notice, the particulars of which, however, are not yet published. And, lastly, my attention has been called to another case, published in the 'Liverpool Hospital Reports,' 1867, which I had accidentally overlooked, in which Mr. Long obtained a good result—natural respiration and fair voice having been restored. To the details of these cases I shall venture to direct attention on a subsequent occasion. For the present they may be regarded as confirmatory of the opinions expressed in this communication, and added to the number of successful cases.

In at least three cases the result can only be considered as negative, no harm seeming to have been done by the operation, nor any good to have been effected by the attempt made.

Two cases are incomplete, but in each of these the final result will probably prove to be good.

Lastly, in two cases—and in two only—death appears to have resulted more or less directly from the operation. In each of these, however, “pyæmic” poisoning led to the fatal issue. The first (No. 31 in the Appendix to the present paper) is that in which Debrou, of Orleans, successfully removed a fibrous growth after division of the thyro-hyoid membrane and thyroid cartilage. In order to avoid risk of suffocation from inflammatory swelling of the mucous membrane of the larynx he also performed tracheotomy. The patient died seven days after the operation. Post-mortem examination revealed the presence of abscesses in the bases of both lungs. The other case is that of Schrötter, of Vienna (No. 32 in the Appendix), in which a futile attempt was made to remove a very extensive cancerous growth from the larynx of a man 63 years of age. After the densely ossified cartilages had been cut through, and the extent and connections of the growth were made manifest, the operation was abandoned. The next day erysipelatous inflammation appeared around the wound, and rapidly spread down the right arm. Gangrene and sloughing of the parts about the larynx ensued, and on the eleventh day the patient died. Post-mortem examination revealed almost universal bronchopneumonia, and purulent infiltration of the areolar tissue of the right arm, &c.

That death should thus have occurred in two cases in the manner described cannot for one moment be considered to indicate any special danger in the operation under discussion. But, on the contrary, that death should *not* have occurred in direct connection with the operation in any other way may fairly, I think, be regarded as affording strong evidence, if not absolute proof, that the operation itself is comparatively free from danger, provided always that due care and skill on the part of the surgeon be exercised.

The conclusion thus expressed is at variance with that stated by Dr. Morell Mackenzie in his recently published and elaborate treatise on "Growths in the Larynx."¹

Considering the prospect of the operation in relation to the preservation of life, Dr. Mackenzie says "in division of the laryngeal cartilages there is always some immediate danger, and nine out of the twenty-eight cases on record terminated fatally."¹ This mode of expression clearly implies that in the cases recorded to have terminated fatally, in the opinion of Dr. Mackenzie, death was due in some way or other to the operation. But it appears to me that such a conclusion is scarcely in accordance with the facts, as may be shown by a critical examination of the cases of fatal result enumerated in Dr. Mackenzie's "Thyrotomy Table."

The first of these cases (No. 1 of Dr. Mackenzie's Table, No. 18 in my Appendix) is that in which Brauers of Louvain cut through the thyroid cartilage of a man aged 40, and then repeatedly cauterized with various preparations and finally with the hot iron the growth which was found to exist in the larynx. Severe suffering was produced, and no doubt life was endangered. But it is distinctly stated in the record given by Ehrmann to which Dr. Mackenzie refers that *death had not yet occurred when the report was furnished*. Further, Krishaber appears to have ascertained that the patient lived twenty years after the operation, and then died of some disease altogether foreign to the larynx.²

The next case (No. 2 in Mackenzie's Table, No. 17 in Appendix of cases to present paper) is that in which Ehrmann removed a papillomatous mass from the larynx of a woman 83 years of age after division of both thyroid and cricoid cartilages. The wound healed favorably. Natural respiration was restored, but the voice was not regained. Seven months after the operation the patient died of typhoid

¹ 'Growths in the Larynx,' p. 94. By Morell Mackenzie, M.D. Lond. 1871.

² See Appendix of Cases, No. 18. Krishaber's precise statement in reference to this case is as follows: "Mais nous apprenons en 1866 seulement que le malade de M. Brauers à survécu à l'opération plus de vingt ans, et qu'il mourut d'une maladie étrangère au larynx."—'Dict. Encyclop. des Sciences Médicales,' Art. "Larynx," p. 762.

fever. The ordinary intestinal lesions were found on *post-mortem* examination, and it was also shown that the larynx was in comparatively healthy condition. There were, however, some indications either of a return of the growth, or that some remnants had been left at the time of the operation. It is not quite clear whether Mackenzie reckons this as a fatal case of thyrotomy or not. In his table he gives us the *result* of the operation "Persistent Aphonia, Death from typhus seven months later;" but in a foot-note on a subsequent page (97) he refers to this case as one "which is justly considered as a case of recovery with aphonia."

The third case (No. 3 in Mackenzie's Table, No. 23 in the Appendix to the present paper) was a case of cancer. The patient survived the first operation fifteen months, and is distinctly reported to have been benefited by what was done.

The fourth case is that operated upon by Rauchfuss, of St. Petersburg (No. 4 in Mackenzie's Table, No. 26 in the Appendix to this paper). The growth could not be entirely removed. Little or no benefit resulted from the operation, but it was not until *two years* afterwards that the patient died; and then the cause of death, ascertained on post-mortem examination, was gangrene of the lungs, apparently set up by the presence of a foreign body (a chicken bone), which had passed through a fistulous communication between the œsophagus and trachea, and was found in the right bronchus. The fistulous opening in question was clearly shown to have no connection with the operation, nor to have resulted from the pressure of the tracheal canula which had been persistently worn.

The fifth case is that in which Sands, of New York, removed a growth from the larynx of a woman 30 years of age (No. 6 in Mackenzie's Table, No. 1 in the Appendix of the present paper). Respiration was perfectly restored; and a good voice, though not normal in tone, was regained. Death occurred twenty-two months after the operation, and was proved, on post-mortem examination, to have been due to cancer of the left kidney and both supra-renal capsules.

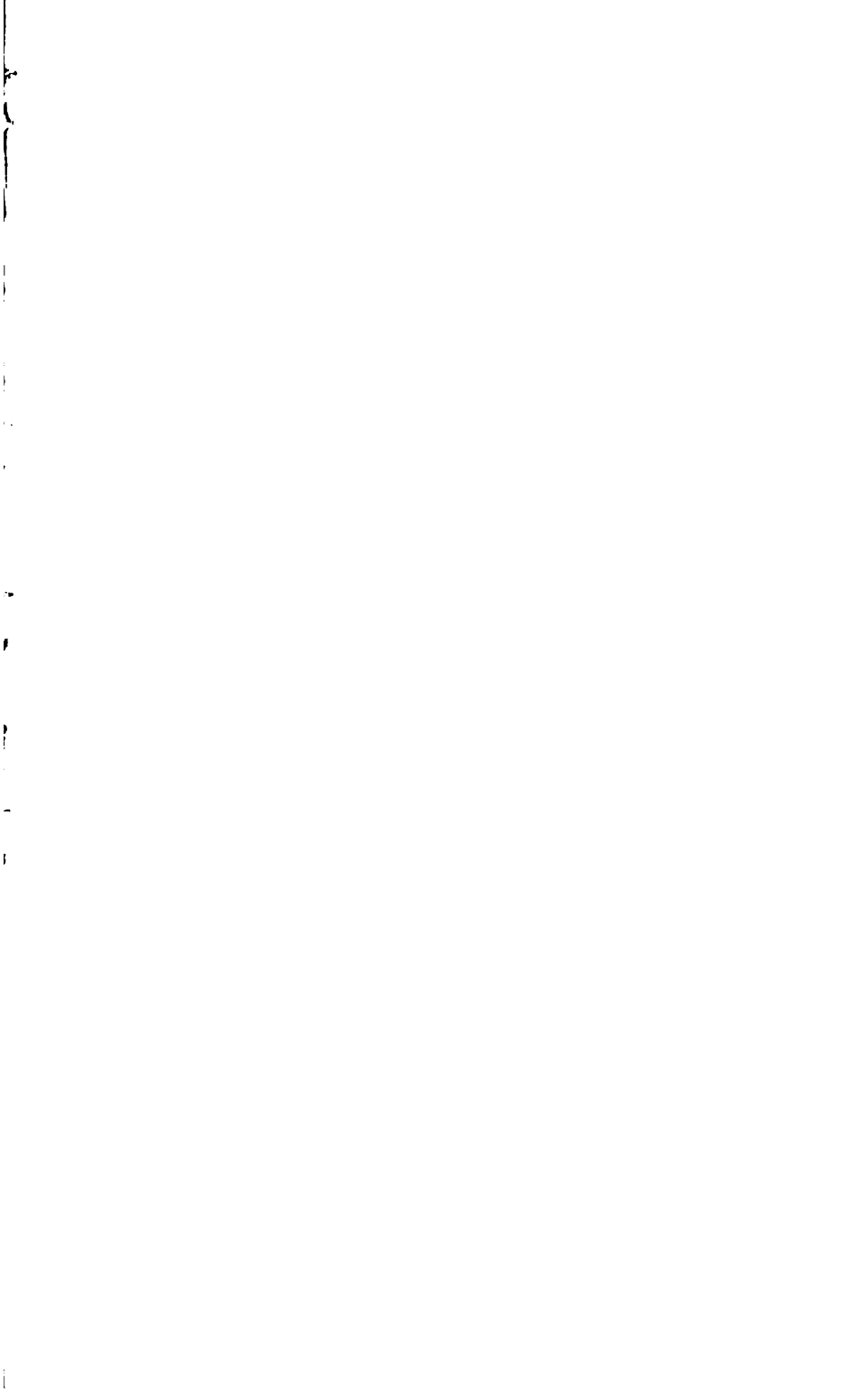
The larynx showed no indications whatever of any recurrence of the malady.

The sixth case is that in which Boeckel, of Strasburg, removed a large papillomatous growth from the larynx of a woman, 24 years of age (No. 7 in Mackenzie's Table, No. 19 in the Appendix to this paper). The wound healed entirely, and the patient left the hospital in good health and returned to her home, breathing perfectly freely, but aphonic. She died from some cause not definitely explained some five or six weeks later, that is, three months after the operation—not two months only, as stated in Dr. Mackenzie's Table. The medical man, who was not called in until the patient was actually *in extremis*, could give no information as to the nature of her fatal illness. Boeckel suggests that she probably died of some intercurrent affection of the lungs which she contracted in the rude climate of her valley. At any rate it seems clear that there was nothing to connect her death with the malady from which she had previously suffered, and still less with the operation by which she had been indisputably relieved from that malady. There is every probability that if there had been any recurrence of her laryngeal symptoms they would have been at once recognised and duly reported.

The seventh case, that of Debrou (No. 9 in Mackenzie's Table, No. 31 in the Appendix to this paper) has been already alluded to as a case in which the fatal issue may legitimately be ascribed to the operation. The patient died of pyæmia seven days after the operation. On post-mortem examination metastatic abscesses were found in both lungs; but the part operated upon, and the larynx generally appeared to be healthy.

The eighth case (No. 10 in Mackenzie's Table, No. 24 in the Appendix) was a case of cancer. Death did not occur until a year after the operation, and Sir Duncan Gibb, who (with Mr. Holthouse) had charge of the case, distinctly intimates that temporary benefit resulted.

The ninth case (No. 25 in Mackenzie's Table, No. 32 in the Appendix) I cannot at present satisfactorily explain.





The reference given ('Medizin. Jahrbücher,' Wien, 1869, vol. xvii, 2nd Heft, p. 81), the date, and the name of the operator, &c., apply to the case of Schrötter, already mentioned (No. 32 in the Appendix), in which the operation was abandoned and the patient died some days subsequently. But Dr. Mackenzie states as the result "Death from hæmorrhage in seven hours." Now it will be recollected that Schrötter's patient survived the operation until the eleventh day (*not seven hours only*), and then died from broncho-pneumonia, and exhaustion resulting from erysipelas and gangrene, and *not from hæmorrhage*.

Further, although I have made diligent search, I have hitherto failed to find any case on record in which death occurred from hæmorrhage in seven hours (or, indeed, after any longer period) as the result of this operation. If I had been able to do so, the details would have been furnished with those of the other cases appended to this paper, and the case would have been duly taken into account in the conclusions expressed. Dr. Mackenzie, however, would appear to have obtained evidence of the occurrence of such a case, inasmuch as, in his general remarks he emphatically makes the statement, "In one case the patient died from hæmorrhage seven hours after the operation." It is obvious, therefore, that in some way or other a serious mistake has been made, or else that an important oversight has occurred. Under any circumstances, however, Schrötter's case, as already stated, must be regarded as one in which the operation directly conduced to the fatal result, though not in the manner stated by Mackenzie.

The last case in connection with which a fatal result is recorded in Mackenzie's table (viz. No. 26 in Mackenzie's table; No. 25 in the Appendix) was one of malignant epithelioma, in which the growths do not appear to have been entirely removed. Recurrence or increase speedily took place, and death occurred about seven months after the operation. In this case the patient, who was under the care of Dr. Mackenzie and Mr. Wordsworth, experienced considerable temporary relief as the result of the operation.

It would thus appear that, out of the nine cases which Dr. Mackenzie speaks of as having terminated fatally, only two can be properly regarded as cases in which death resulted in any way from the operation; and in each of these the fatal result was brought about in a manner by no means special to this operation, but, alas! of far too common occurrence in general surgical experience.

That patients suffering from cancerous disease of the larynx should die at periods varying from six months to two years after it had become absolutely necessary to do something for their relief argues nothing as to the danger of the operation performed. But that temporary relief should be obtained, as is stated to have been the case in each of the above-mentioned instances, may fairly be considered to afford evidence in favour of the means adopted.

Having thus attempted to show that the danger to life attending this operation is comparatively small—at any rate, very considerably less than has been represented—I pass on to make a few remarks upon some of the difficulties likely to be encountered.

Judging from my own experience and observation, and from a careful study of the recorded experience of others, I have no hesitation in expressing the opinion that such difficulties are fewer, and more easily overcome than appears to be generally supposed.

First, with regard to hæmorrhage:—If the incision is kept strictly to the middle line, it is impossible that any large vessel can be wounded. Moreover, the parts are necessarily divided to such an extent that any wounded vessel is fully exposed and easily secured. The effects of entrance of blood into the trachea *look* much more formidable than they really are. If only the divided parts are widely opened out, and so maintained that air may enter freely, any blood that may be drawn in (or, at any rate, the greater part of it) is sure to be very quickly coughed out again. There is a great difference between the conditions in this operation and those in a simple tracheotomy. In the latter case the opening made into the air-passage is comparatively small, deep-seated, and,

it may be, half-hidden. Blood may possibly, therefore, enter from some unseen source more quickly than air, and more quickly, too, than it can be expelled. But when the cartilages of the larynx are divided, there ought to be easily maintained both free entrance for air and free exit for blood.

Bleeding from the internal surface of the larynx is easily enough controlled and arrested by pressure or the application of styptics when the bleeding surface is so completely exposed to view as it may, and ought to be in this operation. The difficulties that are stated to have been met with appear to have arisen in great measure from insufficient exposure of the parts.

The introduction of a tracheotomy canula (in case tracheotomy has not previously been performed) into the lower part of the wound, and the insertion of a small piece of sponge into the trachea above the canula, may afford material aid in securing free respiration and hindering the flow of blood down the air-passages.

The spasmodic up-and-down movements of the larynx, and the violent paroxysms of cough that occur when the larynx is opened, may often give rise to trouble and delay in the operation. But after a little time, the parts being allowed to remain at rest, these symptoms subside; and, although for a period they may seem alarming, no danger need be apprehended if only a full supply of air is ensured.

Next, with regard to the division of the cartilages:—Experience shows that the operation may be easily and successfully accomplished, even though the cartilages are densely ossified. In such case, however, cutting forceps or strong scissors answer better than the knife.

There is no great difficulty in avoiding the vocal cords while cutting through the thyroid cartilage. In only one case among those recorded in the Appendix is it stated that one of the vocal cords was accidentally injured (see No. 11). In this case no material harm resulted, though the voice was probably less perfectly restored than might otherwise have been the case. If the opening is commenced below, and a grooved director passed up between the vocal cords, their

safety may be absolutely insured; but such a proceeding I believe to be unnecessary, it seeming to me to be the best plan to divide the cartilages by cutting through them from without inwards, and from above downwards, and to separate slightly the alæ of the thyroid cartilage before actually penetrating the mucous membrane.

In the removal of the growth no great difficulty is likely to occur unless some important part of the larynx is structurally involved in the growth. In such case the part involved may be removed to a greater or less extent with the tumour, —as was done in a case recorded by Kœberlé, in which he removed the right vocal cord with the growth, and exposed the internal surface of the thyroid cartilage (see Case 20 in Appendix); or, some portions of the growth may be cut away and the remainder deeply cauterised; or it may prove necessary to abandon the operation altogether. But whatever difficulty may arise in the removal of the tumour, whether from its nature or connections, it is obvious that such difficulty can be overcome much more readily and much more certainly when the larynx is freely opened, as in this operation, than could possibly be accomplished by any method of proceeding carried on through the natural passages.

In a considerable number of the cases in which this operation has been attended by success, many abortive attempts had previously been made to remove the growths through the mouth—attempts that were defeated in part by the difficulty experienced in detaching the growths.

With regard to the best method of performing the operation, and the precautions to be observed, little need be said beyond what has been already advanced or may be gathered from the records of cases in the Appendix. The various methods adopted by different surgeons are duly described with the general details of the several cases. The extent to which the laryngeal walls should be incised must of necessity be determined by the precise situation and extent of the growths which are to be removed. As a general rule it is probably best to begin by dividing the thyroid cartilage and crico-thyroid membrane, and subse-

quently to continue the section upwards through the thyro-hyoid membrane, and downwards through the cricoid cartilage and upper rings of the trachea to such an extent as may be necessary in order to expose fully and completely the bulk and points of attachment of the growth or growths. Experience has shown, as may be seen on reference to the Appendix, that cases in which both thyroid and cricoid cartilages, thyro-hyoid and crico-thyroid membranes, and the upper rings of the trachea have been divided, have been followed by results as successful as those obtained after section of the thyroid cartilage alone.

The questions,—1st as to whether tracheotomy should be performed as a preliminary; and, 2ndly, as to whether it is desirable to leave the canula in the trachea after the major operation has been completed,—must be determined by the circumstances and conditions of the particular case to be dealt with. In many instances it has happened that there has been no option, and tracheotomy has been performed under urgent necessity, and at times when the major operation would have been impracticable, or even perhaps before it has been possible to arrive at a satisfactory diagnosis.

There can be no doubt that in the majority of instances it is advantageous that a canula should be in the trachea, while the growths are being removed, and until all bleeding has ceased. But so far as the result is concerned it would appear to matter very little whether the trachea has been opened at some anterior period, or whether this has been done as a first act in the major operation. In each of my own three cases tracheotomy had been performed some years previously—in Mr. Colley's case a short time previously—while in Mr. Bryant's the tracheotomy and the opening of the larynx formed parts of one and the same operation. In all cases in which the growths have been numerous, or their attachments have been extensive, and in which, therefore, the mucous membrane of the larynx has been exposed to much damage and rendered especially liable to become inflamed, I think it is desirable to leave the canula in the

trachea, at any rate for some days, as a safeguard. It is true Debron considered the presence of the canula to have indirectly conduced to the death of his patient. But this can be regarded only as a very exceptional occurrence. In case the growths should be few or single, and the mucous membrane but slightly interfered with, it may perhaps be considered safe to dispense with the use of the canula and to close up the whole wound at once. This was done in Krishaber's case. (See Appendix No. 13.) No canula was introduced,—indeed, the thyroid cartilage only was divided, and the wound was closed by sutures. It was found necessary, however, to remove the sutures and the wound opened. A perfect result, however, speedily ensued. In one of Balassa's cases (No. 7 in the Appendix) the operation was performed twice on the same subject. The first time tracheotomy was performed as a preliminary, and the canula was allowed to remain for a certain period after the completion of the major operation. All went well; but recurrence of the growths took place. At the second operation the thyroid cartilage and the crico-thyroid membrane only were divided. The trachea was not opened. No canula was introduced; but the whole extent of the wound was at once and entirely closed by sutures. The result was perfectly successful.

A just estimate of the general and special merits of the operation of opening the larynx by section of the cartilages in order to facilitate the removal of morbid growths can only be obtained by personal experience, or by the careful study of the full details of the recorded experience of others; and I cannot but think that the examination of the records of cases appended to this paper will lead those who have hitherto had no personal experience of the operation to the general conclusions at which I have arrived, viz., 1st that the dangers and difficulties attending it are neither so numerous nor so considerable as have been represented and commonly supposed; and, 2ndly, that the success hitherto achieved has been so marked and so indisputable as to justify and encourage in any such

case as may seem appropriate an earlier, bolder, and more ready resort to this method than has hitherto prevailed.

It is quite unnecessary to enter upon any discussion as to the relative merits of the method of removing growths from the larynx after the section of the cartilages, and the various methods that have been devised and practised for removing such growths through the natural passages by aid of the laryngoscope.

The results obtained in very many cases by these latter methods may be reckoned among the most brilliant triumphs of modern surgery. And no one, I think, would nowadays consider it justifiable to cut open the larynx to facilitate the removal of any growth or growths that could be easily, safely and completely removed through the natural passages. But unfortunately it happens that cases occur from time to time in which the growths are numerous or very large, or single but firmly attached; or in which the patients are young, and ill able to bear the introduction of the necessary instruments through their narrow natural passages; or again, in which excessive sensibility of the parts, and irritability of the patient render futile all attempts through the mouth. In such cases there can be no doubt, I think, that resort to the method I have been discussing affords the best chance of success; and, indeed, reference to the Appendix will show that in many cases it was not adopted until other methods had been tried and found useless.

Further, it may be urged that in all cases in which the nature of the growth is suspicious greater security against recurrence may be obtained by the more complete removal that may be assured after the larynx has been opened and its interior fully exposed to view. This very obvious fact is not in accordance however with what would appear to be the opinion of Dr. Mackenzie, who seems to intimate that recurrence is more likely to take place after the larynx has been opened than if removal through the mouth has been effected.¹ But it must be borne in mind that Dr. Mackenzie's conclusions

¹ See Report of Dr. Mackenzie's paper, read before the British Medical Association, 'British Medical Journal,' 1871, vol. ii, p. 245.

as to the comparative liability to recurrence of a growth after the different operations are derived from a numerical comparison of two sets of cases; and that cases of cancerous disease are freely included in one set but rigidly excluded from the other.¹ It is needless to say which set of cases presents the largest proportion of instances of recurrence.

In conclusion I would only add that I propose to take an early opportunity of asking permission to lay before the Fellows of the Royal Medical and Chirurgical Society the results of my experience, and reading relative to the operation of opening the larynx by section of the cartilages in order to facilitate the removal of foreign bodies.

APPENDIX.

CASE 1.—Malignant Growth; Tracheotomy; Cricoid and Thyroid Cartilages, &c., divided; Growth entirely removed. Result successful; Respiration perfect; Voice restored, though not to its normal tone. Death twenty-two months later from Cancer of the Kidneys, &c.

(‘New York Medical Journal,’ May, 1865. Dr. H. B. Sands, New York.)

Maria M—, æt. 30, came under observation in January, 1863, suffering from an affection of the throat of about three months’ standing. Her general health was good. In September she caught cold but recovered. In October her hoarseness returned, and gradually increased. There was slight dyspnœa occasionally, and some feeling of constriction in the throat. Dr. Simrock pronounced the case to be one of polypus of the larynx.

Laryngoscopy by artificial light showed “a red roundish tumour springing forth from between the upper and lower

¹ See ‘Growths in the Larynx,’ Op. Cit.

vocal cords," and apparently taking origin by a rather broad pedicle from the ventricle of Morgagni. Its surface appeared uneven and granular. Laryngoscopy by sunlight showed "that the tumour, instead of being pedunculated, was sessile, with its broadest diameter on the floor of the ventricle."

A particle of the tumour was removed, "the microscopical examination of which showed it to be unmistakably cancerous." "The mass consisted of a well marked fibrous stroma, having alveoli which were filled with cells having large nuclei."

On the 28th of February, 1863, ether having been administered, an incision five inches in length was made in the median line from above the level of the thyroid cartilage to within two inches of the sternum. The larynx and the trachea as low as the third ring were laid bare. The trachea was opened (the isthmus of the thyroid gland having been divided), and a tube with a slit along the upper wall was inserted. The incision "was then extended by means of a probe-pointed bistoury, through the cricoid cartilage, crico-thyroid membrane, thyroid cartilage and thyro-hyoidean membrane, as far as the os hyoides, dividing the base of the epiglottis."

Considerable cough, spasm, and vomiting followed, and some of the vomited matter passed down into the trachea.

The divided *alæ* of the thyroid cartilage having been pulled apart, "the growth presented itself as a rounded fleshy looking excrescence about as large as the end of the little finger springing forth from the left ventricle, projecting rather more than a quarter of an inch into the cavity of the larynx, and overlapping and concealing from view both the upper and lower vocal cords."

The growth was cut off with a pair of curved scissors at the level of the lower vocal cords, which were apparently healthy. Further examination showed that "the tumour had a very broad attachment to the cartilage forming the floor of the ventricle."

After extirpation as complete as possible by scissors and forceps the actual cautery was applied. The wound was

closed by sutures except at the lower part where a double canula was inserted.

The after progress was in every way satisfactory. On the fifth day the tube was removed. On the tenth day the patient sat up.

At the end of four weeks the patient "left the hospital, having meanwhile regained her voice to a very great degree."

"The patient remained in good health for a long time after the operation. Her voice never regained its natural tone, although it acquired a very considerable degree of resonance." Laryngoscopic examination showed no indication of return of the growth.

In October, 1864, signs of cancerous cachexia accompanied failing of general health; and on the 4th January, 1865, more than twenty-two months after the operation, she died.

Post-mortem examination showed cancer of the left kidney and ureter, as well as of the right and left supra-renal capsules. In the larynx there were no signs of any return of the growth.

"The growth removed from the larynx was soft, vascular and succulent, and its microscopical characters were evidently cancerous. It consisted of a delicate framework of connective tissue, the meshes of which were filled with cells of various shapes and sizes containing large nuclei and nucleoli."

CASE 2.—Polypoid Growths; Repeated attempts at removal through Mouth; Laryngotomy; Renewed attempts; Thyroid divided; Growths removed. Result successful; Respiration perfect; Voice good and improving.

('Wiener Med. Wochenschr.,' 1st February, 1865, p. 147; Planchon, *op. cit.*, p. 58; 'Berlin Klinische Wochenschrift,' No. 52, December, 1864. Drs. Ulrich and Lewin.)

N. J—, æt. 16, came under observation in 1864. There had been loss of voice, and increasing dyspnœa during four

years. Repeated attempts were made by Dr. Lewin, to remove a growth (which was recognised by aid of the laryngoscope) through the mouth, but only small fragments could be got away. The growth itself, which appeared as large as a hazel-nut, resisted all efforts to extract it. The difficulty was increased by the abnormal smallness of the throat and larynx. The growth appeared to be attached to the left false vocal cord.

On the 8th October, laryngotomy was performed, and a tube introduced through the crico-thyroid membrane; and further attempts were made to remove the growths through the mouth, but these failed as before.

On the 31st October, chloroform having been administered, the thyroid cartilage was divided in the median line, and the parts being separated, the growths were removed in two portions by scissors. The growths were situated in the ventricles, being attached to the vocal cords. They had the appearance of fine-pointed condylomata. Caustic was applied to the points of attachment. The tube was replaced, and the wound closed by sticking plaister. On the third day, the tube was removed.

On the 23rd November, the wound was almost completely cicatrised, the firmness of the larynx showing that the divided halves of the thyroid cartilage had become firmly united. Respiration was perfect, and the voice returned and gradually improved; at the time of the report, however, though the patient spoke plainly, it was in a somewhat bass voice.

It is worthy of note that only a comparatively short time had elapsed since the operation, and that, therefore, there might in all probability be expected a greater improvement in the voice after a longer interval.

CASE 3.—*Papillomata (probably congenital); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed; Recurrence of Growths; Second Operation; More*

Growths removed. Result successful ; Respiration perfect ; Voice good, but not perfect.

('New York Medical Journal,' September, 1867, vol. v, No. 6.
Dr. Gouley, New York.)

Emma W—, æt. 6, came under observation on the 7th December 1864. At the age of three months (May, 1859) she "took a severe cold." She suffered from considerable dyspnœa and was quite ill for some time. At the age of twelve months (February, 1860) she was seized with attacks of dyspnœa, generally worse at night. These attacks increased in severity and frequency. At the age of about eighteen months, (June, 1860) she had an attack of pneumonia, for which she was blistered, &c. Improvement in her breathing followed, and she was to all appearance restored to health. In 1862, she had inflammation of the bowels, followed by ischio-rectal abscess, during the progress of which she screamed violently from pain. To this the parents attributed the return of her dyspnœa and hoarseness.

In February, 1864, she was treated for what was supposed to be diphtheria. From this period "dates the commencement of her aphonia, which increased gradually until she could only speak in a husky whisper." In October her strength began to fail, the dyspnœa rendering her restless and sleepiness at night. "During some of the paroxysms of dyspnœa she became frantic and unmanageable, and grasped everything that came in her way like one drowning."

On the 8th December 1864, tracheotomy was performed, the patient being under chloroform; and a canula was secured in position. Respiration was carried on easily and freely through the canula. Laryngoscopic examination (by Dr. Simrock) showed, "several whitish looking pedunculated growths above the vocal cords. These growths were isolated and of different sizes, but not one was larger than a small pea." Owing to the inclination of the epiglottis perfect exploration was impossible. The introduction of other instruments, besides the laryngeal mirrors, was so stre-

nously resisted that there was no chance of detaching the growths or any portions, and bringing them away through the mouth. In the course of the next two months the growths increased very rapidly.

February 26, 1865.—Ether having been administered, an incision was made through the soft parts on to the larynx; the canula was then withdrawn from the trachea, and a blunt-pointed bistoury introduced through the opening, and carried upwards through the rings of the trachea and the isthmus of the thyroid body. A portion of the growth was seen between the divided portions of the upper rings of the trachea. The probe-pointed bistoury was again introduced; by its means were divided successively from below upwards, and from within outwards, the cricoid cartilage, crico-thyroid membrane, thyroid cartilage, thyro-hyoid membrane, and the base of the epiglottis. On separating the cut edges, the morbid growths having the appearance and consistency of cauliflower excrescence were at once seen filling the laryngeal cavity and tightly impacted therein. They extended upwards beyond the rima glottidis, and could be felt by the finger inserted through the mouth. The principal tumour one inch in length, and one-third of an inch in its greatest transverse diameter, was attached by a narrow peduncle to the right inferior vocal cord, and to nearly the whole length of the left inferior vocal cord; it had also a broad attachment to the left ventricle, and half filled the ventricle. There were also ten or a dozen smaller growths. All were carefully removed by curved scissors. Persulphate of iron was applied, the tube reintroduced into the trachea, and the upper part of the wound closed by silk sutures.

Very little general disturbance ensued. During the first two or three days some of the fluid attempted to be swallowed passed through the upper part of the wound.

March 8th.—The wound was nearly closed; the patient was up and playing about the room. The orifice of the tube was corked, and she breathed freely through the natural passages.

16th (Eighteen days after the operation), the tube was

removed, and the patient could speak in a whisper. In the course of a few weeks she could make herself distinctly heard and understood.

About the end of August, there was recurrence of embarrassment in respiration and voice, and laryngoscopic examination showed recurrence of the disease.

In November (nine months after the first operation), ether was administered, and laryngo-tracheotomy was repeated; several tumours were excised as before, but they were smaller than those removed previously. "The sum of all the growths removed on the last occasion would not exceed one half of the volume of the first crop." After excision of the growths, chromic acid was freely applied. The upper part of the wound was closed and a tracheal canula inserted. No untoward symptoms occurred. The wound healed favorably, but not so rapidly as on the first occasion. Five weeks after the operation laryngoscopical examination showed the vocal cords to be quite free from any outgrowth, but irregular and crippled. The tube was withdrawn three months after the operation.

In July, 1867 (twenty months after the last operation), the child was in excellent health, breathing freely, and able to speak in a loud and very distinct whisper, so as to be heard in any part of the house.

Laryngoscopic examinations showed no recurrence of growth, but some irregularity of the vocal cords.

CASE 4.—Polypoid Excrescences (? Cystic Growths); Thyroid Cartilage and Crico-thyroid Membrane divided; Growths removed. Result successful; Respiration perfect; Voice good, but low.

('Wiener Med. Wochenschr.,' 28th June, and 1st July, 1865; 'British Medical Journal,' September, 1865; Planchon, op. cit. Gilewski, Cracow.)

A girl, æt. 16, was first seen in 1864. During several months there had been hoarseness and noisy respiration especially during sleep. Laryngoscopic examination showed

three polypoid excrescences at the anterior angle of the glottis. These had a half fleshy, half mucous appearance. Two were larger than pins' heads, the other was about as large as a pea.

In December, 1864, the crico-thyroid membrane and the thyroid cartilage were divided in the middle line, and the larynx opened. It was then found that the mucous-like polypus which under laryngoscopic examination had appeared as large as a pea, was reduced to two small pale fragments of areolar tissue. It had been observed that a small quantity of watery fluid escaped at the time the thyroid was incised. This fluid was probably the contents of a cyst which had constituted the tumour. There was also found a small hard pale-coloured excrescence, as large as a pin's head. This was removed by scissors. The edges of the wound were brought together by sticking-plaister. No constitutional disturbance ensued, and the patient breathed freely. There was slight difficulty in swallowing.

The wound united and perfectly closed during the third week, and the voice gradually became more and more distinct. Respiration being free from the first. Three months after the operation the voice was becoming clear, but was still somewhat low in tone (*un peu grave*).

In this case it would appear that any attempt at removing the growths through the natural passages was prevented by the sensitiveness of the parts, and by the position of the epiglottis which interfered with the distinct and complete laryngoscopic view of the interior of the larynx.

Some months after the operation, it is stated, there was hoarseness again, which, however, was to be attributed to an acute catarrh.

CASE 5.—Epithelial Growths (Non-Malignant); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed. Result successful; Respiration free; Voice natural.

('Wiener Med. Wochenshr.' 11th November, 1868; Planchon, op. cit., p. 73. Balassa, Pesth.)

Catherine O—, æt. 44, came under observation for the

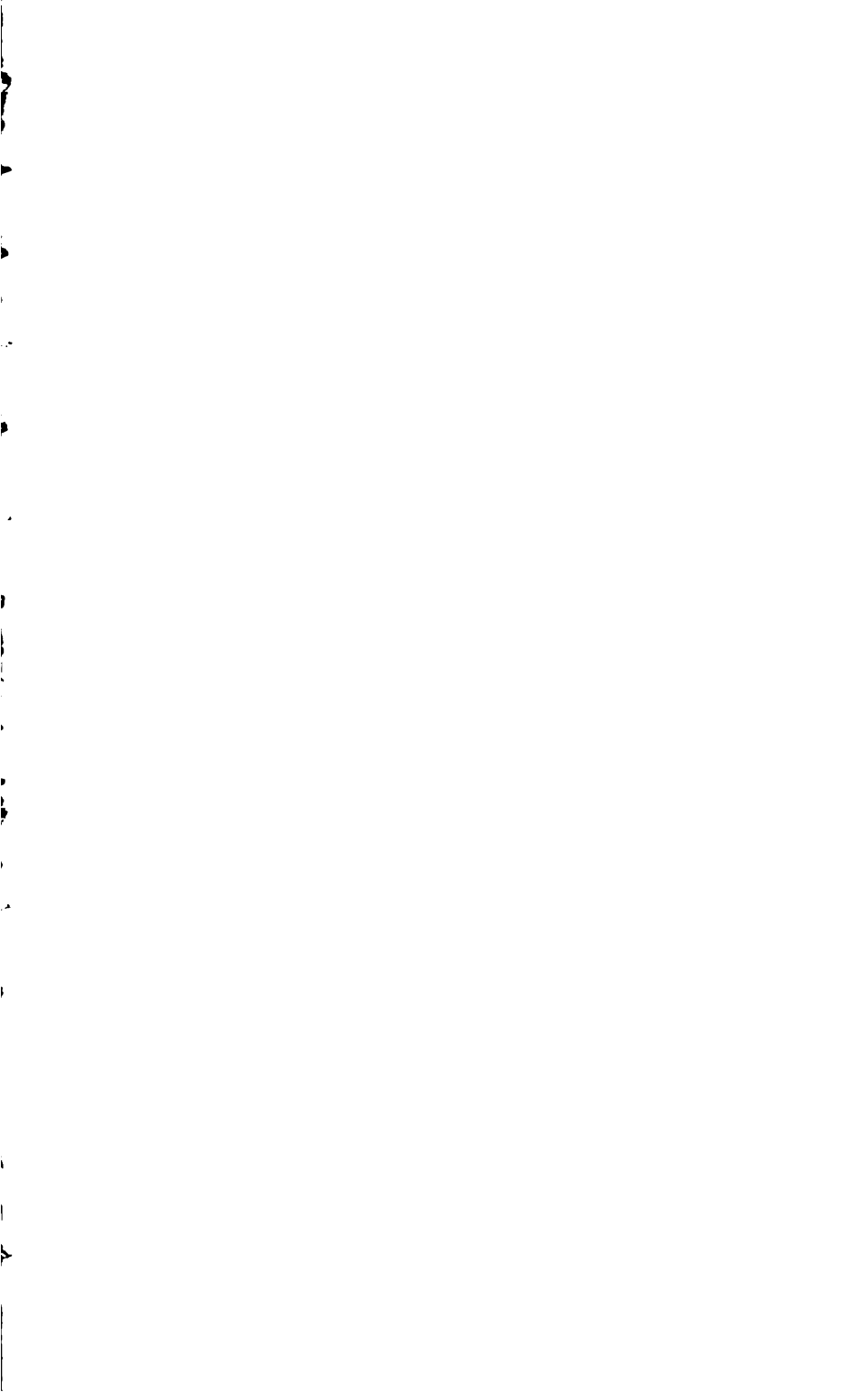
first time on the 23rd June, 1865. She had taken cold from drinking cold water when she was hot, and consequently had suffered from sore throat, with difficulty of swallowing and hoarseness. Some weeks afterwards she could only speak and breathe with great difficulty. The dysphagia subsided; the other symptoms persisted. In previous years she had suffered from time to time from similar symptoms which, however, had subsided. Some years previously she had been cured by operation of nasal polypus.

On admission she was suffering from aphonia, and difficult and painful respiration, and dysphagia. Laryngoscopic examination showed swelling of the mucous membrane of the pharynx and larynx, œdematous encroachment on the glottis from abnormal condition of the mucous membrane. &c.* Under treatment the symptoms were considerably ameliorated.

24th July.—The patient was again admitted, with recurrence of unfavorable symptoms. Laryngoscopic examination showed that the contraction had greatly increased in extent, and that the cavity of the larynx was closed. A night of extreme suffering from urgent dyspnoea and impending suffocation was passed.

The next day the trachea was first opened, and a canula introduced. The incision through the skin, &c., was then prolonged upwards as far as the hyoid bone, and the median line of the larynx was laid bare. Then by means of a blunt-pointed bistoury, introduced above the opening in the trachea, the larynx was severed along the middle line, and the divided edges were held apart. Many excrescences (like bunches of grapes) were then seen adhering to the interior of the larynx. These were cut off by scissors. There were five in all, two large and three small. The largest about the size of a pea was the one that had been seen in the laryngeal mirror between the lips of the glottis. The others were in the

* A full description of the laryngoscopic appearances is given, but not quoted here, as having no important bearing on the operation; and, further than that, the general swelling concealed the growths subsequently discovered.





ventricles. The wound above the canula was closed by sutures and sticking plaister.

Microscopical examination, by Professor Margo, showed the growth to be epithelial in structure.

During the first few days there was some difficulty in swallowing, and sometimes liquids passed into the air-passages and through the canula, producing fits of coughing. Otherwise the progress was satisfactory. On the sixth day the patient left her bed, and could speak audibly when the orifice of the canula was closed by the finger. Laryngoscopic examination showed great improvement in the condition of the larynx.

Twenty-one days after the operation respiration was free even when the canula was removed and the opening closed by the finger. The voice was clear, and deglutition perfect. Laryngoscopic examination showed that the parts had all but recovered their normal appearance.

On the 25th August (thirty days after the operation), the canula was finally removed. The wound soon entirely closed; and the patient left the hospital in full enjoyment of voice and respiration.

She was seen subsequently in October, 1865. A small wart, the size of a lentil, was discovered. This disappeared entirely after cauterization. It is not distinctly stated whether this was internal or external, but probably the latter, inasmuch as the larynx is stated to have been quite normal, and the wart is referred to as appearing on one point in the linear cicatrix of the wound.

CASE 6.—Epithelial Growth; Attempts at removal through Mouth; Thyroid Cartilage divided (without Tracheotomy); Growth removed. Result successful; Respiration free; Voice pure and sonorous.

('Wiener Med. Wochenschrift,' 18th November, 1868. Planchon, op. cit., p. 60. Balassa, Pesth.)

Joseph H—, chimney-sweeper, æt. 32, was first seen on the 5th November, 1866. Four years previously he had caught cold, become hoarse, and suffered from dyspnoea and cough.

He had a sensation of a foreign body (movable) when he wished to expectorate. His trouble gradually increased. On admission his respiration was difficult, and his voice hoarse; during deep inspiration a trembling noise was heard. From time to time he had paroxysms of cough, with mucous expectoration.

Laryngoscopic examination showed a rounded tumour the size of a small hazel-nut coming from the right ventricle, half filling the glottis, attached by a largish base, sometimes purplish, sometimes red, with a mulberry-like surface, and trembling during the passage of air. Attempts were made to surround the growth with the platina wire of the galvanocaustic apparatus. But all attempts failed. The patience of the sufferer was exhausted, and his sufferings were severe.

Operation.—The median line of the larynx being laid bare, the wall was cut through gradually by gentle strokes of a bistoury. A slight transverse incision was carried through the crico-thyroid membrane along the lower border of the thyroid cartilage. The separation of the divided parts by blunt hooks brought into view the tumour (a purplish epithelioma) pressed against the right vocal cord, and trembling at the passage of the current of air. The tumour was at once removed, and the wound after its removal was exactly above the vocal cord; in size it was about as large as a haricot bean. There was little bleeding. The wound was closed by metallic sutures and plaister except at the lower part, where it was left open to the extent of a line and a half in case of accident.

The lower part of the wound remained open during thirty-six hours. The rest healed by primary union. The cure was complete in eight days; and the patient left the hospital with pure and sonorous voice, and free respiration.

In this case tracheotomy was not performed as a preliminary, nor was a tracheal tube introduced after the operation.

This case is remarkable for the rapidity with which the cure was accomplished, as well as for the perfect success of the result.

CASE 7.—*Epithelial Growths ; Prolonged and repeated Treatment through the Mouth ; Tracheotomy ; Thyroid and Cricoid Cartilages, &c., divided ; Growths removed ; Recurrence of Growths ; Repetition of Operation, without Tracheotomy ; Thyroid Cartilage and Crico-thyroid Membrane only divided. Result successful ; Respiration free ; Voice good.*

(‘Wiener Med. Wochenschr.,’ 14th November, 1868; Planchon, *op. cit.*, pp. 62 and 79. Balassa, Pesth.)

Fanny F—, a domestic servant, æt. 21, came under observation 29th January, 1867. Two and a half years previously she caught cold, suffered from severe fever, and her voice became hoarse. Medical treatment diminished the evil, but her voice remained suppressed, and her breathing difficult, with pain in the upper part of the chest.

On the 25th of May tracheotomy was performed. The thyroid cartilage was then incised in the middle line (also the cricoid, and the crico-thyroid membrane), and the growth was removed in five different portions, of which one was as large as a small pea, and the others smaller.

After the operation there was both local and general disturbance. An energetic production of vegetations took place about the wound in the trachea. The wound in the larynx healed rapidly, and without difficulty.

The vegetations about the wound in the trachea, which appeared internally as well as externally, were vigorously cauterized.

The tube was removed at the end of five weeks. When the patient left the hospital at the end of the Clinique there was a vegetation of the size of a pea on the trachea. The voice was sonorous, the respiration free.

For some months the patient went on well, having returned to her occupation ; but after the first half of the winter she again lost her voice, and experienced great difficulty in breathing.

Laryngoscopic examination showed a new growth, granu-

lous in appearance, with a large base, and purplish blue in colour, under the angle of the inferior vocal cords, and springing from the seat of the wound in the trachea. Violent paroxysms of cough, threatening asphyxia, were frequent, especially in the night.

Second admission, 4th February, 1868.—On admission the patient was aphonic; her respiration difficult and painful, —more difficult during the night. Sometimes she suffered from paroxysms of spasmodic cough, during which her countenance became livid. Laryngoscopical examination showed the superior and inferior vocal cords apparently normal, but the cavity of the larynx below the true vocal cords filled with a growth rising from before backwards, whitish-yellow in colour, irregularly rosy, and rugose with granular elevations. Repeated cauterizations with solutions of nitrate of silver, &c., of varying strength, were applied. The cauterizations are said to have diminished the consecutive inflammation of the mucous membrane. But the growth increased, and the sufferings of the patient became more severe, and her condition urgent.

Second operation.—On the 30th of February, 1868, the larynx was again opened by careful incision along the line of the old cicatrix. There was no tracheotomy performed as a preliminary. After the median section of the thyroid a transverse incision was made through the crico-thyroid membrane. The growth was removed in three or four portions by means of scissors, and the wound was then at once and entirely closed by sutures (some applied through the cartilage?).

The progress of the case presented no difficulty. The sutures were removed on the 7th June, and the patient left the hospital on the 23rd June, breathing freely, and having recovered her voice.

Microscopical examination of one portion showed a fibro-cellular structure, with elastic fibres and connective-tissue-corpuscles in great abundance, and on the surface an epithelial layer. Another portion showed fibres in fasciculi interspersed with cells, fatty granules, and large oil-globules.

Another showed fat-cells and gland structure with fibres and connective tissue.

This remarkable case illustrates forcibly the small amount of danger attending the operation.

It is worthy of note that the tracheotomy, which was performed as a preliminary to the first operation, seems to have been hurtful rather than useful.

The trachea was not opened at the second operation, nor does it appear that the cricoid was cut, and yet if it were not it is difficult to understand how the growths were reached.

CASE 8.—*Sarcomatous Growths; Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed. Result successful; Respiration free; Voice good.*

(*Wiener Med. Wochenschr.*, 14th November, 1868; Planchon, op. cit., p. 77. Balassa, Pesth.)

Maria D—, æt. 19, first came under observation 29th April, 1867. She had caught cold from sleeping in the open air three years previously, and had become hoarse and had pain in her throat. Her hoarseness continued; and bye-and-bye difficulty of breathing supervened. These symptoms gradually became worse.

On admission her voice was much obscured; her respiration was whistling; and she had frequent attacks of threatened suffocation. Laryngoscopic examination showed the epiglottis swollen, and of a sombre red colour; the superior vocal cords normal; the inferior visible throughout their extent; the cavity of the larynx occupied below on each side by a whitish growth, having a granular aspect; in front the borders of these growths almost touched, behind they were progressively further apart. These growths were exactly beneath the inferior vocal cords.

On the 30th April, 1867, tracheotomy having been performed as a preliminary, the operation was carried out as in the preceding case, and the growths were removed in a similar manner. The growths were removed in five or six pieces, varying in size from that of a lentil to that of

a pea. They had the consistency and appearance of *sarcomata*. Microscopical examination was not made, the growths being lost. There was some bleeding, which was arrested by pieces of sponge. The wound was closed by sutures.

Slight febrile disturbance followed; and a great quantity of mucus escaped during frequent attacks of cough. After the first night, however, all went well. The wound healed by first intention. The swelling within the larynx around the wound, due to the ablation of the tumours, only disappeared little by little; and the canula could not be removed until the middle of the third month. At that period respiration and voice were in their normal condition, and on the 17th of July the patient left the hospital. The laryngoscope showed a remaining portion of new growth at the situation of the cicatrix of the trachea.

A small portion of growth appeared to have been left or to have sprung up afresh.

CASE 9.—Papillomatous Growths on Vocal Cords; Attempted removal through Mouth; Inflammatory Swelling produced; Tracheotomy; Thyrotomy (Cricoid not divided). Result successful; Respiration free; Voice regained; Recurrence of Growth two and a half years afterwards.

(From 'Growths in the Larynx,' by Morell Mackenzie, M.D. London, 1871, p. 162. Mackenzie and Couper, Norwood and London.)

Miss B—, æt. 66, was first seen 21st April, 1868. She was suffering from frequent attacks of very severe dyspnoea. Her voice had been lost since 1854. Laryngoscopic examination showed "a large, bright red, lobulated growth, about the size of a gall-nut, blocking up the anterior two thirds of the glottis."

29th April.—Miss B— came to town. On six occasions large fragments of the growth were removed by forceps through the mouth, but after the operation on 18th May so much inflammatory swelling took place that Dr. Mackenzie "did not consider it safe to pursue this method of treatment any further."

21st May.—A very severe attack of dyspnoea came on in the evening. Similar attacks came on whenever she began to doze.

22nd.—Tracheotomy was performed by Mr. Couper and a canula inserted. Local anæsthesia was employed; chloroform was not administered.

Half an hour after the insertion of the canula Mr. Couper divided the thyroid cartilage in the middle line. The larynx being held open by retractors, Dr. Mackenzie seized the growth with strong short forceps, and took away the greater part of it. The base was then cut more cleanly away with curved scissors. The alæ of the thyroid were united by silver sutures.

"The patient was relieved by the operation of all dyspnoea, and only complained of some soreness and slight difficulty in swallowing for a few days;" "she seemed to get well without any trouble." The voice was entirely regained, and the patient "remained quite well for two and a half years, i. e. until the autumn, 1870." At this period laryngoscopic examination showed commencing recurrence of the growth. The growth slowly increased during the winter 1870-71.

CASE 10.—Growths (? of Syphilitic origin); Attempts at destruction and removal through Mouth; Tracheotomy; Larynx opened and Growths removed; Indications of recurrence; General and local Treatment. Result successful; Respiration perfect; Voice not materially affected.

('Virchow's Jahresbericht,' Berlin, 1870, Band II, p. 117; quoted from the 'New York Medical Records,' August, 1869. Cohen, New York?)

The patient, a merchant, first seen in 1868 (?), had been suffering from hoarseness for three weeks. Laryngoscopic examination showed a grayish-white smooth tumour, the size of a bean, occupying the whole length of the left vocal cord. This was cauterized, and, as the result,

was divided into two portions, one of which was coughed up, and was found on microscopical examination to be epithelial in character. After further cauterization with chloride of zinc the tumour increased, and resort was had to the galvanic cautery. By means of this several portions were removed, in which, however, epithelial cells were not found. In spite of (or in consequence of?—A. E. D.) these methods of treatment the growth continued to increase until it had reached the size of a hazel-nut.

Laryngotomy, preceded by tracheotomy, was performed, and the new growth was removed. The part from which it grew was cauterized. In the course of a fortnight the growth began to spring up afresh.

Under such circumstances it was determined to desist from further operation, and change of climate was advised. The patient was sent to travel in Europe, and directed to take iodide of potassium, and to insufflate tannin twice a day, he having been taught autolaryngoscopy in order that he might do this. While in Europe he took and inhaled sulphurous waters, and dilute caustic solutions were applied. Nothing further was done.

After his return from Europe the general health of the patient was as good as the condition of his larynx was satisfactory. Minute traces in the larynx of the different operations were the sole indications of the now surmounted malady, but these did not materially affect the voice.

It may be considered doubtful, perhaps, whether or not the growth in this case was not of syphilitic origin; and if so whether it was not to the iodide of potassium and the sea voyage, &c., that the cure must be attributed rather than to the operation.

Respecting this case Mackenzie says simply, "Condition of voice not stated." "Recurrence began to manifest itself a fortnight after operation."

Now, the condition of the voice is alluded to very plainly, and Mackenzie omits to state that the patient returned after a voyage to Europe with only minute traces of the various operations in his larynx.

CASE 11.—*Polypoid Growth ; Thyroid Cartilage and Cricothyroid Membrane divided ; Growth removed. Result successful ; the Voice good, but harsh.*

(‘Berlin Klinische Wochenschrift,’ 7th December, 1868, p. 501.
Navratil, Pesth ?)

R. B—, a clergyman, was first seen in 1868. The patient was suffering from a polypus the size of a bean on the under surface of the left vocal cord, which became most distinctly visible during forced expiration and phonation. During tranquil breathing only a slight elevation of the vocal cord was visible.

Operation.—The crico-thyroid membrane and the thyroid cartilage were divided along the middle line, and the two portions held apart. Considerable spasm ensued, and a quantity of blood flowed into the larynx. The growth was thus for a time concealed from view. In consequence, too, of the convulsive cough the right vocal cord was slightly injured anteriorly. The polypus was at length seized, and cut off with scissors. Nitrate of silver was applied to the surface from which it had been cut off, and the wound was closed by sutures and sticking plaster.

The patient recovered quickly from the effects of the operation, and the wound healed by first intention in the course of a few days. A small slough separated from the part where the vocal cord had been accidentally injured, and left a small breach of continuity. The place where the polypus had been healed up entirely.

The voice remained harsh and hollow, in consequence, probably, of the above-mentioned notch in the vocal cord, this permitting air to pass through, and thus giving rise to want of clearness of tone.

CASE 12.—*Polypoid Growth ; Thyroid Cartilage divided ; Growth removed. Result successful ; Respiration evidently perfect (no mention being made) ; Voice good.*

(‘Berlin Klinische Wochenschrift,’ 7th December, 1868, p. 502.
Navratil, Pesth ?)

S. A—, a merchant, æt. 30, came under observation in

1868. A polypoid growth the size of a pea was seen by aid of the laryngoscope on the lower border of the left vocal cord. Navratil resolved to remove it after opening the larynx, on account of the difficulty of getting at it through the mouth.

Operation.—Local anæsthesia by means of æther was produced, the superficial incisions were made, and the thyroid cartilage was divided. Spasmodic contractions of the muscles ensued, which rendered difficult the further progress of the operation. After some time the polypus was seized and cut off. The wound was closed by sutures and sticking plaster.

On the second day the patient suffered from severe febrile symptoms, and the wound in the neck discharged bloody matter, the parts becoming œdematous. Some blood, &c., was coughed up. During the following days a profuse discharge of offensive matter took place and the œdema increased. Swallowing became difficult.

On the sixth day the constitutional disturbance subsided, and the swelling of the neck decreased. The appetite returned, and all went well. At the end of four weeks the wound entirely healed.

On laryngoscopic examination the vocal cords appeared perfectly normal, but somewhat sluggish in their movements. Some inflammatory swelling was observed about the anterior angle. The voice during the day was quite clear, but somewhat hard and hoarse in the morning. Insufflations of tannin were ordered, and the patient left the hospital.

CASE 13.—Polypoid Growth; Thyroid divided (without Tracheotomy); Growth removed. Result successful; Respiration and Voice normal.

(Planchon, 'Faits Cliniques de Laryngotomie,' Paris, 1869, p. 33; also 'Med. Times and Gazette,' 20th November, 1869. Abstract of Communication to Surgical Society, Paris. Krishaber, Paris.)

Charles B—, æt. 38, was first seen on the 2nd December, 1868. Eight years previously he had begun to suffer from

cough, at first slight, subsequently more severe, and during the winter convulsive. After severe exposure to wet, he had lost his voice, but after a time had partially regained it. The high notes were lost, the low ones obscured. His voice was often muffled and hoarse. His general health was good. This state of things continued during six years without notable change for the worse.

During the last two years the embarrassment of breathing coming on with the cough had become obviously increased; the fits of coughing had become more and more frequent: and his voice was becoming extinguished, having progressively diminished in intensity and resonance.

In September, 1868, the symptoms all became aggravated, —the paroxysms of cough much more frequent. The advice of Dr. Ruffey was sought, but no material improvement being effected, Dr. Krishaber was consulted on 2nd December.

At that period the voice was hoarse; the respiration noisy; the cough frequent and convulsive; a long inspiration occurred at the end of each phrase of speech; there was a general sense of uneasiness; and the patient was pale and thin.

On laryngoscopical examination an isolated polypus was seen situated on a level with the anterior attachment of the vocal cords in such a way as to conceal a portion of the right vocal cord. This showed itself in a manner varying with the state of the glottis. It disappeared almost during inspiration, and seemed only as large as a pea, with an irregularly ovoid contour. During normal voice sounds the tumour enlarged and concealed two thirds of the right and one fourth of the left vocal cord. During an attempt at a high note, which could not be produced, the tumour stretched out so as to cover the greater part of the boundaries of the glottis. The sound produced was very hoarse. On further examination the tumour, when it partially disappeared, did not pass below the vocal cords, but into the ventricle, whence it issued on attempting high notes. It was club-shaped, not quite regular in contour; grayish in parts, elsewhere white.

Several attempts were made to extract the growth through the mouth. Forceps (Mathieu's), opening antero-posteriorly, were first tried, without success. Next the tumour was seized by forceps opening laterally, and small portions were torn off; but the tumour itself was so tough that it was impossible to pull it from its attachments. Next repeated cauterizations were tried, with only ill results. A further attempt at extraction was made, but without success. All these abortive attempts were perseveringly made during two or three weeks, or more; and then, on February 9th, 1869, the larynx was opened and the tumour extracted as follows:—An incision was made on to the thyroid cartilage, which was then divided in the middle line by scissors. The upper two thirds of the cartilage were easily divided, the lower third with difficulty, it being ossified. It was broken rather than cut through. The tumour was then easily brought into view, seized by forceps, and cut off by scissors at the root. The attachment of the tumour was in the ventricle of Morgagni.

Respiration immediately became normal, and the lips of the wound being held together the patient was able to sing up the scale.

The crico-thyroid and thyro-hyoid membranes are said not to have been cut. The trachea was not opened, nor does it appear that any canula was introduced.

Sutures were applied, but they had to be at once removed.

Perfect reunion of the edges of the wound, gradually extending from above downwards took place. On the fifteenth day all was closed except a small opening that would admit a goose quill. On the thirty-ninth day union was complete.

On the forty-first day all the indications of a healthy condition were present; the breathing was free, the voice normal, the cough gone. Laryngoscopical examination showed that the vocal cords presented a normal appearance.

Microscopical examination of the growth by M. Ranvier showed the characters of a fibrous tumour containing a considerable number of glands.

CASE 14.—*Polypoid Growth ; Tracheotomy ; Thyroid and Cricoid Cartilages, &c., divided ; Growth removed. Result successful ; Respiration perfect ; Voice good, though hoarse.*

(‘Transactions New York Academy of Medicine,’ vol. iii, Part 10, 1870. Gardon Buck, M.D., New York.)

John McG—, a coachman, æt. 38, was first seen 15th April, 1870. His voice was reduced to a hoarse whisper ; his respiration was obstructed and laboured. He was thin and sallow. For years past his colds had been attended by violent coughing. Three or four months before admission his voice had begun to be affected, and his breathing to be disturbed. These symptoms had gradually become aggravated. His sensations referred to the larynx as the seat of his trouble. Laryngoscopical examination showed a growth in the cavity of the larynx below the vocal cords. Palliatives were used until 22nd, but without good effect. The dyspnœa increased ; and suffocative exacerbations became more severe and threatening. The danger of suffocation seemed so urgent that it was decided to resort to tracheotomy without further delay.

First operation, 23rd April, 1870.—Tracheotomy was performed without etherization, and under urgent circumstances. The two first rings of the trachea and the cricoid cartilage were divided in the median line, and then the crico-thyroid membrane was cut transversely by a T incision. A tracheal tube was introduced, and respiration through it became tranquil.

Second operation, 24th April.—After etherization the thyroid cartilage was exposed by continuation upwards in the middle line of the incision made on the previous day. A grooved director was passed through the existing opening into the larynx from below upwards, and the thyroid cartilage was divided along the median line by a pair of scissors curved edgewise, and the incision was continued upwards through the thyro-hyoid membrane. On drawing the divided portions apart the whole cavity of the larynx seemed filled by the growth ; further examination showed that it

occupied the right wall of the larynx, involving the ventricle and both cords, underneath which it had originated, and which it had elevated and pushed inwards. A small pedunculated portion emerged from between the cords, and protruded further into the cavity of the larynx. To remove the mass an incision circumscribing its base, extending half an inch below the inferior vocal cord, was carried down to the cartilage, from the surface of which the whole mass was detached from below upwards. After dividing its connection above, it was found that the right arytenoid cartilage had been excised, and formed a part of the mass removed. Two or three suspicious points were touched with the actual cautery. Sutures were applied over the thyroid cartilage, and pins above and below the tube, which was left in the trachea. The growth was of firm consistency, and found to be made up of small, round, nucleated cells, about the size of lymph-cells, imbedded in a tolerably abundant fibrous stroma.

The after progress was so favorable that in three or four days the patient was up and about. *Respiration* easy, *voice* much as before the first operation. He wore a hard rubber tube of median size, corked at the outer extremity.

25th May.—The tube accidentally broke off from the collar-piece and fell into the trachea. No alarming symptoms, however, immediately followed, and it was thought the tube might have got into the œsophagus and been swallowed.

1st June.—Auscultation of the chest showed signs of chronic pulmonary mischief on the right side, due, probably, to the presence of a foreign body.

2nd.—A long incision was made into the trachea, extending from the already existing opening. Professor H. B. Sands, having introduced his fore finger, could just feel the foreign body. A long slender pair of dressing forceps bent edgewise at an obtuse angle being then introduced, the tube was seized and extracted. The wound was closed by sutures. At the end of three or four days the patient was up again, and about the ward.

17th.—Wound healed above and below tube.

27th.—Laryngoscopic examination showed the glottis patulous; the mobility of left cord was normal, its excursion in approaching the right side exceeded the middle line.

2nd July.—Tube removed.

26th.—All healed.

On the 14th October the general health of the patient was excellent, and his voice improved. Some words were now articulated in a clear tone, whereas previously his articulation had been exclusively in a rough and hoarse whisper.

7th December.—The voice was further improved. Articulation was loud, and no longer whispering, though still hoarse. *Respiration* easy and natural.

“An important point in this case is the condition of the voice after the removal of the vocal cord and arytenoid eminence of the right side. In this respect the case is believed to be unique.”

Report of laryngoscopic examination, by Dr. R. F. Weir. —“The left vocal cord is drawn beyond the median line towards the opposite side in phonation. The cicatrix presents a sharp curved line, running backwards and appearing to be attached to the opposite arytenoid cartilage, and lost in the adjacent pharyngeal tissues. The bridle-like cicatrix moves slightly to meet the remaining vocal cord in phonation.”

CASE 15.—*Sessile Growths; Attempts at removal through Mouth; Thyroid Cartilage, &c., divided; Growths removed. Result partially successful; Great benefit for a time; Voice clear, but coarse; Indications of recurrence sixteen months afterwards.*

(‘Boston Medical and Surgical Journal,’ 18th February, 1869, vol. iii, No. 3, p. 37. E. Cutter, M.D., Boston.)

Albert L—, æt. 53, came under observation in April, 1846. In 1846 he was injured by overturning a large jar of bromine, “the vapour from which strangled him and almost deprived him of life.” “He attributes his subse-

quent laryngeal affection to the inveterate habit of smoking tobacco." No venereal taint.

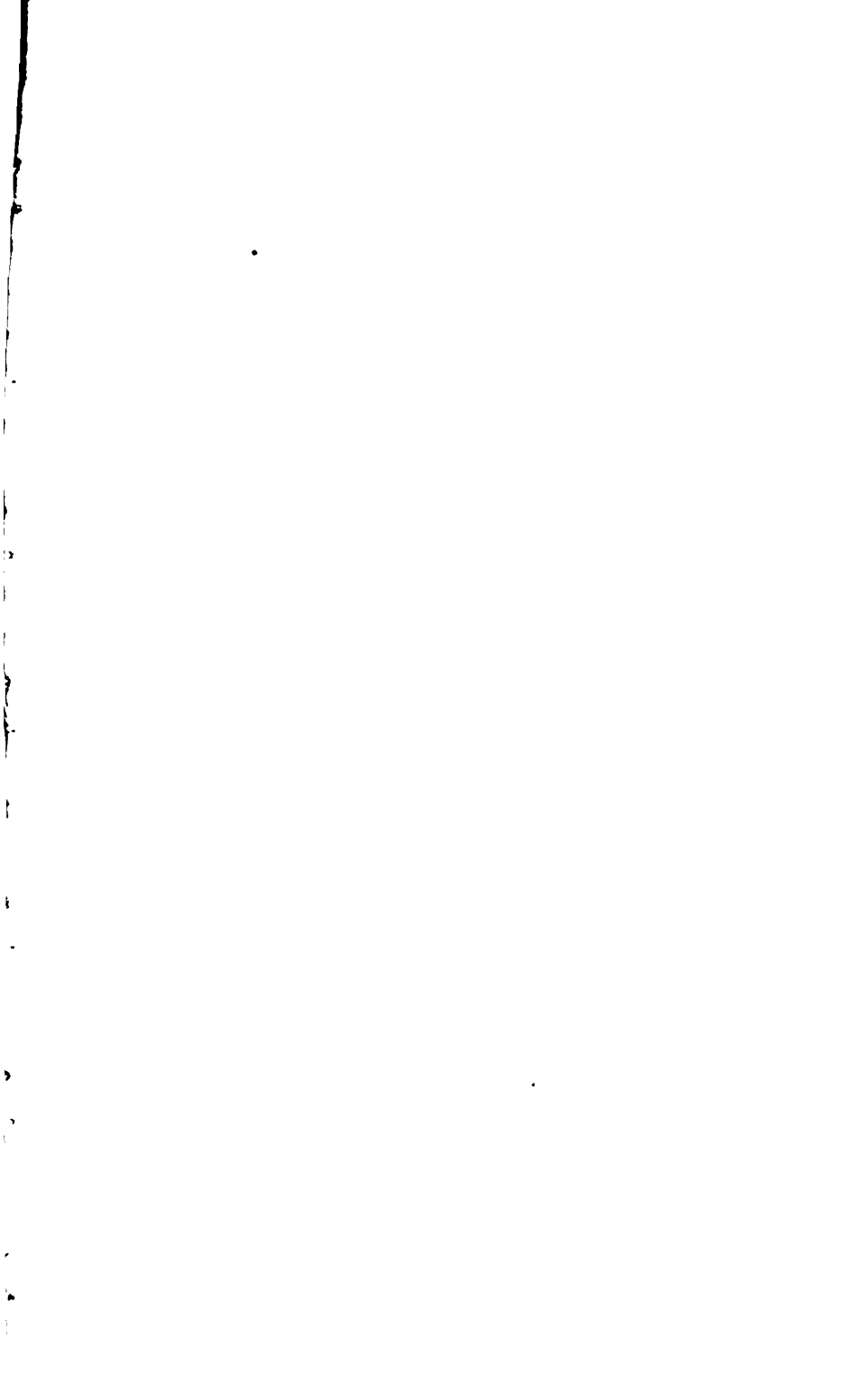
In April, 1864, he became hoarse. Various methods of treatment were ineffectually adopted. "He had sleepless nights; he lost flesh, strength and energy, and became short of breath on exertion. He became indifferent to life and was tempted to suicide. He said that 'he felt like a man out in the open sea in a boat without oars or rudder, expecting every moment to be capsized.'"

In April, 1867, he came under Dr. Cutter's observation, who on laryngoscopic examination discovered the existence of "a sessile tumour, occupying the whole of the upper surface and free edges of the left vocal band, and a small portion of the right vocal band near the thyroid insertion."

"Attempts were made to remove a portion [of the growth] by the mouth, with little success."

On the 26th September, ether having been administered (while getting under the influence he appeared to have been somewhat violent), "an incision was made with a scalpel in the median line from the hyoid bone to the third tracheal ring." "The thyroid cartilage was found to be ossified. After the external hæmorrhage had ceased the lower blade of a bone forceps was entered through the crico-thyroid membrane exactly in the median line." "Simply closing the forceps with force sufficed to sever it cleanly in the middle. The section through the soft tissues was completed with the scissors." "The severed parts were held apart by hooks." "The new growth was completely revealed. On the left cord it appeared as a minute lobal excrescence, occupying the whole inner edge like a fringe and the lower or tracheal surface. On the right vocal cord the growth was similar, but close to the thyroid insertion. It proved to be fragile. The whole growth was removed by the scissors, leaving the surface clean and smooth." "The surface was then cauterized with the acid nitrate of mercury." As the effect of the anæsthetic passed off, the patient again became violent.

"The most remarkable feature of the violence was the



completeness of his prostration" [? phonation—A. E. D.]. "He spoke in a loud coarse voice, resembling that of a sea captain in a storm. This phonation lasted for several hours. The return to complete sensibility was retarded by the accumulation of blood and mucus in the mouth which ran down into the trachea, and out of the artificial opening. It was also accompanied by profuse sweating, and some flagging of the pulse. The wound was closed by five sutures through the skin only. The patient was then led to his bed in an adjoining chamber. He was faint and chilly, but his pulse was 80, regular and full." After vomiting a quantity of blood mingled with mucus, the patient assumed a more natural appearance. The after progress was very favorable.

29th September.—Wound united.

30th.—Sutures removed.

2nd October.—Patient downstairs.

5th.—Plaisters removed.

8th.—"Phonation coarse and clear."

17th.—"Under the laryngoscope everything appeared normal, except a slight œdematous protuberance towards the thyroid extremity of the left vocal cord."

23rd.—"The larynx looks very well inside, the vocal cords having their normal pearly sheen." Some adhesion of the cicatrix to the trachea was removed by subcutaneous section.

About sixteen months after the operation, *i. e.* in February, 1869, it is reported that "there is an appearance of a return of the disease on the right vocal cord."

This case is referred to by Dr. Mackenzie in the following terms: "Persistent dysphonia; recurrence of growths in less than a month after operation;" and in note—"Thyrotomy was performed in the first instance; but as the patient almost died under the operation from blood passing into the trachea, an extensive incision had to be made from the upper rings of the trachea to the thyro-hyoid membrane. Improvement in voice is reported; but as the growth recurred in less than a month persistent aphonia would probably more correctly describe the condition." I am unable to explain the discrepancies.

CASE 16.—*Growth ; Thyroid and Cricoid Cartilages and upper rings of Trachea divided ; Growth removed ; Canula introduced. Result partially successful ; Respiration perfect ; no satisfactory (i.e. sufficient) information as to Voice.*

British Medical Journal, 4th November, 1871. Langenbeck, Berlin.)

Philip B—, æt. 28, came under observation in 1871 (?) after having suffered during three or four years. The malady had come on very gradually. Quite recently there had been such difficulty in breathing that, especially at night, he often had fits of asphyxia of several minutes' duration. He could swallow well. Laryngoscopic examination showed the entrance of the larynx free, the epiglottis normal, also the vocal cords ; but below the vocal cords a swelling with a raw and uneven surface, was seen proceeding from the anterior commissure to the left, below the left vocal cord, involving therefore the left half of the larynx (*i. e.* its lower part).

On the 25th May, 1871, an incision was made through the crico-thyroid membrane, and extended upwards through the thyroid cartilage nearly as high as the attachment of the vocal cords, and downwards through the cricoid cartilage, and as low as the third ring of the trachea. The vocal cords were in no way injured. On opening the trachea the growth immediately showed itself. It was seized with forceps and cut off, and its situation was well cauterized with *Ferrum Candens*. The bleeding, which was slight, was easily arrested by a small sponge. A canula was introduced and the wound closed by sutures.

Bronchitis came on for a day or two, but gradually subsided ; and all went well.

On the fifth day the canula was withdrawn, and the edges of the wound were brought together by adhesive plaister. Speedy recovery followed. "The difficulty in breathing has entirely vanished, and he now awaits his discharge, cured."

CASE 17.—*Warty Growths ; Thyroid and Cricoid Cartilages divided (Laryngo-tracheotomy as a preliminary) ; Removal of Growths. Result partially successful ; Respiration free, but Voice not restored.*

(Ehrmann, op. cit., p. 23. Ehrmann, Strasbourg.)

Caroline M—, æt. 33, first noticed an alteration in her voice in the autumn of 1840. She suffered from gradually increasing harshness and hoarseness of voice and finally became aphonic. But there was neither pain nor difficulty in breathing. Sometimes, however, by a quick inspiratory and expiratory movement she could cause a noise like that of a valve opening and shutting. Sometimes drops of liquid passed into the larynx, and excited violent fits of coughing. During such coughing small portions of tissue, similar to the growth afterwards extirpated, were sometimes expectorated.

During three years and a half there was no serious symptom beyond the loss of voice ; but in March, 1844, she was suddenly seized with extreme difficulty of breathing. It seemed to her that a mechanical obstacle prevented the free entrance and exit of air, and that a foreign body obstructed her throat. Temporary relief was obtained, but a fresh access of severe dyspnœa soon came on. Laryngo-tracheotomy (through the crico-thyroid membrane, the cricoid cartilage, and two rings of the trachea) was performed and a tube introduced. This was followed by immediate relief.

Two days after the laryngo-tracheotomy the opening made into the larynx was extended upwards through the thyroid cartilage and thyro-hyoid membrane as high as the hyoid bone. On separating the edges of the wound the growth, a cauliflower-like mass, with here and there rounded granulations on its surface, came into view. It was seized by forceps, and excised by means of a bistoury in three portions, which together made a voluminous mass. It was attached along the left vocal cord. The interior of the larynx appeared smooth, except where the growth had been attached. The movements of the arytenoid were free. The vocal

cords had not been injured by the knife. The lips of the wound were brought together by sticking-plaister (sutures do not appear to have been used). The canula was left in the lower part of the wound (as before).

The patient passed a comfortable night. The next day there was slight reaction, but the febrile symptoms speedily subsided. The day following the canula was removed, and respiration was performed easily through the natural passages. The third day the general condition was good; respiration free; deglutition easy; no pain; no swelling of the parts, but the voice still suppressed (*voilée*). On the twenty-first day after the operation no air passed by the wound, and the patient went into the country. On her return, at the end of eight days, the wound was completely healed, and her general health was perfect; but the aphonia persisted. During the following six months all went on well, the general condition being perfect, and respiration being altogether unembarrassed. In October the patient suffered from an attack of abdominal typhoid fever, under which she sank and died.

Post-mortem.—The examination proved the cause of death to have been typhoid fever, the ordinary lesions of the intestinal tract being present. The left vocal cord was a little shortened, and slightly puckered, and was prolonged under the form of raised striæ towards the base of the epiglottis; it appeared by such direction to diminish the extent of the corresponding ventricle. Some small granulations were situated along it on the folds of the mucous membrane; a granulation, somewhat larger and of vesicular appearance, was at the point of junction of the two vocal cords.

Microscopical examination of the tumour showed epithelial cells, squamous rather than cylindrical, and rare traces of fibro-plastic tissue mixed with the granulation elements.

This case certainly must be regarded as satisfactory in its results. There can be no ground for attributing the fatal issue in any way to the operation. It was clearly proved, not only by the symptoms, but by post-mortem examination, that death was due to typhoid fever.

CASE 18.—*Warty Growths ; Thyroid Cartilage divided ; Growths repeatedly cauterized. Result partially successful, but Voice apparently not restored.*

(Ehrmann, 'Histoire des Polypes du Larynx,' p. 12; from 'Journal de Gröfe et Walthers,' 1834, vol. xxi, p. 534. Brauers, Louvain.)

An architect, æt. 40, during the year 1833 had had embarrassment of respiration, which seemed attributable to a growth in the larynx. All sorts of remedies, external and internal were tried without benefit.

Operation.—The thyroid cartilage was divided throughout its length from below upwards; a mass of warty growths was then brought into view filling up the laryngeal cavity. These were cauterized with acid nitrate of mercury.

After several days the growths had acquired such dimensions as to render respiration again difficult. The wound, almost closed, was enlarged by ablation of a portion of the thyroid cartilage. The tumours grew again and again in the places where they had been cauterized, and in direct proportion to the cauterizations. Lastly, the red-hot iron was applied. Slight inflammation of the interior of the larynx, but severe inflammatory engorgement of the posterior part of the organ causing compression of the œsophagus, ensued; but in three days this subsided. As the result of successive irritations produced by repeated cauterizations, the larynx passed into a state of scirrhus induration. Hectic fever supervened, which seemed almost certain to prove fatal; but this issue had not occurred when the physician who reported the case gave his account of it at Bonn.

Dr. Krishaber comparatively recently ascertained that the patient survived the operation more than twenty years, and died of a malady altogether unconnected with the larynx. ('Dictionnaire Encyclopédique,' art. "Larynx," p. 762.)

The early history of this case is not satisfactory. It is quoted by Ehrmann from the 'Dissertation' of Dr. Urner, to whom it was communicated by Professor Wutzer, to whom it had been told by "a Belgian physician," whose name is not given.

But even supposing the expected fatal result had ensued, surely such result must have been attributable to the after-treatment, the cauterization, &c., rather than to the opening of the larynx. It was the method of removing the growths, not the means employed for getting at them, that was in fault.

This case, therefore, has no bearing against the operation of opening the larynx for the removal of growths, but quite the contrary.

Commenting on this case Krishaber says, "It shows, 1st, the correctness of the diagnosis which led to the operation, without the aid of the laryngoscope; 2nd, the facility with which certain forms of polypus sprout out again and again after their partial destruction; 3rd, the necessity of conjoining the application of caustics with the performance of laryngotomy."

CASE 19.—Papillomata; Thyroid and Cricoid Cartilages and upper rings of Trachea divided and Growths removed. Result partially successful, but Voice not restored. Death three months later; Cause not absolutely ascertained.

('Mémoires de la Société de Chirurgie de Paris,' T. vi, p. 561. Boeckel, Strasbourg.)

Marie F—, æt. 24, was first seen in June, 1863. During the winter of 1862 the patient had begun to suffer from chronic hoarseness. Towards the following autumn dyspnoea and harshness of voice supervened. In June, 1863, she was admitted into the Maison de Santé. A few days after her admission she was suddenly seized by an attack of suffocation so severe as to make it believed she was dead. After some minutes respiration was re-established, and the next day she was as usual.

Early in July laryngoscopic examination showed a grayish mammillated mass which filled the whole upper orifice of the larynx, being as large as a small walnut. On digital examination the growth appeared to be implanted by a large surface

on the left aryteno-epiglottidean fold. Some days afterwards a small fragment was coughed up, and the patient stated this had happened several times. The fragment on examination proved to be a portion of a papilloma or warty growth. The dyspnœa continued; inspiration was prolonged, and accompanied by hoarse sound. The patient wasted; the aëration of the blood was evidently defective; the voice was completely lost, but cough was rare.

20th July.—Repeated attempts were made to remove the growth through the natural passages by means of forceps and the wire snare; and after three or four successful efforts as much was removed as equalled in size a small walnut. The patient then, much fatigued, declared herself more comfortable.

Some days later laryngoscopical examination showed the larynx much more free, but also revealed the presence of considerable growths lower down, which had previously been concealed. Repeated cauterizations were made, but it became evident that entire removal or destruction of the growth through the natural passages was impossible.

8th August.—The face of the patient was cyanotic, and the obstruction to respiration very great. She could no longer lie down. Laryngoscopical examination showed the growth, "the mammillated mass corresponding to the two anterior thirds of the glottis, with an irregular opening behind."

11th.—Chloroform having been administered, the superficial structures were divided along the median line; and when all bleeding had ceased (a vein having been ligatured), the first ring of the trachea, the cricoid cartilage, and the crico-thyroid membrane were cut through at one incision from below upwards, and a large canula was introduced. Large polypoid masses were at once seen. A grooved director was then introduced, and the thyroid cartilage was divided by one stroke of the bistoury. Fresh, strawberry-like masses made a kind of hernial projection into this opening. The thyro-hyoid membrane and base of the epiglottis were then cut transversely by strong scissors.

The larynx was then cleared out by pulling away the growths piecemeal. Some of them (probably lodged in the ventricles) were still very large. Bleeding was arrested by a cold sponge. Wires were passed through the edges of the thyroid to facilitate their easy separation on subsequent days. The canula was left in position.

12th.—The larynx was again opened ; more growths were removed by dressing forceps, and nitrate of silver was applied.

18th.—The larynx was reopened ; its internal surface was clean but raw. Some points of the mucous membrane which showed a papillary appearance (degenerescence), but without pediculated tumours, were touched with acid nitrate of mercury. A similar treatment was repeated on a subsequent day.

24th.—The wound was closing rapidly, and respiration was free.

At the end of September the wound was closed throughout the greater part. About the middle a fistulous opening remained. Respiration was perfect. The voice was altogether extinct ; but the patient could make herself understood easily, her condition being quite different to that of a person who, wearing a tracheotomy canula, has no voice at all. Small rosy projections, seen on laryngoscopic examination, were cauterized ; and a slight perichondritis which existed over the right ala of the thyroid was treated by the application of tincture of iodine. A slight fistulous opening, leading to the spot where there had been suppuration about the cartilage, remained, but would only admit a fine probe, and no air passed through it.

26th October.—The patient left the hospital breathing freely, but aphonic. The wound was entirely healed.

Five or six weeks later she died. But no distinct history of her fatal malady could be obtained. "It is probable that this unfortunate woman succumbed to some intercurrent affection of the lungs which she contracted in the rude climate of her valley."

In this case removal through the natural passages was impossible, though repeatedly attempted. There is no reason

for supposing that the death of the patient was in any degree due to the operation, nor, indeed, to a recurrence of the disease in the larynx. She survived the operation more than three months.

CASE 20.—*Condylomatous Growths; Thyroid Cartilage and Thyro-hyoid Membrane divided; Growth removed with right Vocal Cord, &c. Result partially successful. Respiration free, but Voice much impaired.*

(‘Thèse de Swebel,’ Strasbourg, 1866; Planchon, op. cit., p. 64; Koeberlé, Strasbourg.)

A locksmith, æt. 57, came under observation in May, 1865. He had been aphonic for seven months and a half, and then suffered from embarrassment in breathing, and difficulty in swallowing. Syphilis denied. (“No syphilitic antecedents”)(?) Laryngoscopic examination (M. Aronssohn) showed œdema of the aryteno-epiglottidean folds, and ulceration of the free border of the left vocal cord. The right vocal cord had disappeared, and in its place was a considerable swelling of condylomatous aspect. The glottic orifice was irregular, deviated towards the left from behind forwards, and was contracted, the proper movements almost abolished. Spasmodic and suffocative difficulty of breathing continued to increase; asphyxia was imminent; and aphonia was complete.

In May, 1865, the larynx, &c., having been fully exposed along the median line, M. Koeberlé rapidly introduced one blade of a pair of scissors through the cricothyroid membrane, and cut upwards through the thyroid cartilage. The thyroid cartilage was completely ossified, nevertheless the section was easily made. The parts divided were forcibly separated, and the thyro-hyoid membrane was partially torn in the course of the longitudinal fibres. The growth (which was as large as a walnut) and occupied the whole extent of the right true vocal cord, was seized by dressing forceps and removed. The base of the growth was very large. In removing it the internal surface of the

thyroid cartilage was exposed. The left inferior vocal cord presented erosions in two places, around which were some small vegetations. The parts were kept open by means of silk passed through the edges of the thyroid cartilage, and steel wire in horseshoe shape. Next day acid nitrate of mercury was applied. A straight canula was introduced, projecting towards the laryngeal cavity.

The patient breathed perfectly through the natural passages. Small portions of the thyroid cartilage necrosed, and were discharged at the end of three weeks.

Seven months after the operation the patient still wore his canula, but it was kept always closed. He breathed freely, and though still partially aphonic, could make himself distinctly understood by speaking in a low voice.

It certainly would have been wonderful if the voice had been restored in such a case as this. Despite the history, it is probable that we ought to regard this as a syphilitic case.

CASE 21.—*Papillomata; Tracheotomy; Thyrotomy; Growths removed. Result partially successful; Respiration free, but Voice not restored.*

(‘Growths in the Larynx,’ by M. Mackenzie, M.D., op. cit., p. 166.
Mackenzie and Evans, London.)

Caroline M—, æt. 12, was seen on the 9th July, 1868. She had been aphonic almost from birth, and at intervals had suffered from most severe attacks of dyspnœa. Laryngoscopic examination showed that the larynx was occupied by growths situated on both vocal cords. It appears the patient attended at the Hospital for Diseases of the Throat occasionally during several years. It was hoped that as she got older she would get more manageable, but the malady became worse more rapidly than her temper improved.

On the 15th July tracheotomy, and then thyrotomy, was performed by Mr. G. Evans, and two warty growths, each

about the size of a raspberry, were removed. They occupied the entire length of each cord. The operation was conducted in the same manner as in a former case (see p. 54). Chloroform, however, was administered.

A good recovery followed. The patient "has never since suffered from dyspnoea; but her voice continues to be entirely suppressed. The larynx has been examined several times during the last two years." There is no recurrence of the growth, nor congestion of the mucous membrane. "The aphonia appears to be due to diminished tension of the vocal cords, which, however, approximate perfectly."

CASE 22.—*Growth probably of syphilitic origin; Thyroid and Cricoid Cartilages and upper rings of the Trachea divided; Growth removed; Cauterization; Canula introduced, and continuously worn; Great benefit; Voice strong, but hoarse. Result partially successful (Case probably not complete).*

('Thèse de Swebel,' Strasbourg, 1866; Planchon, op. cit., p. 70.
Busch, Bonn P.)

The patient was a man, æt. 43, who in 1853 had had syphilis, with all kinds of secondary affections. In July, 1862, he had suffered from inflammation of the kidneys, which recurred the next year. Syphilitic laryngitis came on, and he had attacks of suffocation, and hoarse and noisy cough. His voice was hoarse and almost completely lost. In the course of two months the syphilitic affections of the larynx disappeared under the influence of repeated cauterizations, etc.

6th May, 1863.—Laryngoscopic examination showed the larynx apparently normal; but during deep inspiration a fleshy mass could be seen below the glottis, its base being on the posterior wall of the trachea.

Suffocative attacks becoming again intense, on 24th June Busch opened the trachea, and prolonged the incision to the crico-thyroid membrane. On separating the edges of the

wound the growth was seen. Respiration became free. A canula was introduced. Starting from the wound already made, an incision was carried through the thyroid cartilage as far as the middle. The growth was removed in fragments, and the surface from which it grew was cauterized. The growth extended as far as the inferior vocal cords. The mucous membrane of the trachea remained swollen, but the passage of air was easy, even when the canula was removed. In order to obviate the contraction of the trachea, a canula with two arms was introduced—one short arm rising into the larynx up to below the vocal cords; the other longer, descending into the trachea.

The diameter of the canula was increased; the fleshy granulations were cauterized. The voice was strong enough, but hoarse on account of the slight swelling of the trachea. The general condition was very satisfactory.

Mackenzie, in his table, says of this case—"Persistent dysphonia; recurrence of growth; canula still worn:" and in his 'Appendix,' p. 233, "No benefit." He quotes from 'Beobachtungen zur innern Klinik,' Bonn, 1864.

CASE 23. Malignant Epithelioma; Thyroid and Cricoid Cartilages, &c., divided; Partial removal of the Growth. Some Relief. Repetition of the Operation; Death fifteen months after the first Operation.

('Transactions American Medical Association,' vol. vi, 1853, p. 510. Gurdon Buck, M.D., New York.)

Madam L—, æt. 51, when seen on 14th August, 1850, had been suffering for a considerable period from hoarseness, which had gradually advanced to complete aphonia. The aphonia persisted for more than a year without dyspnœa. On April 21st, 1851, the patient was visited and found to be suffering from "obstruction of the larynx with great dyspnœa and complete loss of voice." Respiration sonorous and laboured; severe cough. On May 3rd the symptoms

were urgent; severe paroxysms of dyspnœa threatened suffocation.

First operation (3rd May, 1851).—An incision was made along median line four inches in length. The crico-thyroid membrane was incised, and the incision was extended upwards through the whole length of the thyroid cartilage (which was ossified, and was divided by scissors) and downwards through the cricoid and upper rings of trachea. The interior of larynx was found to be lined by growths, the largest of which attached by a broad base partly concealed the ventricle, and extended higher up upon the wall of the laryngeal cavity. Two or three small pendulous portions, and several portions of the tumour itself were snipped away. But the whole growth could not be removed. A trachea tube was inserted.

4th May.—Further portions of the growth were snipped away, and acid nitrate of mercury was applied. Gradual improvement ensued, and the patient could breathe through the larynx (the tube being closed), and make herself heard, speaking in a whispering voice. The wound healed except where the tube was retained.

Second operation (20th September).—A fresh incision was made extending through the parts previously divided, and also through the thyro-hyoid membrane. Further portions of the growth were removed, but its extent was found to be so formidable that it was obviously impossible to remove the whole. All that could be got at was seized by forceps, and pared off by a bistoury. The wound was closed throughout the greater part of its extent by sutures; and the tube was replaced. The wound speedily healed, but the growth extended and soon surrounded the tube in such way as to render its introduction (for changing) very difficult.

Third operation (January, 1852).—A fresh opening was made lower down in the neck for the tracheal tube.

In March a portion of one of the arytenoid cartilages was coughed up. Difficulty of swallowing became urgent, and the general condition very much impaired.

4th August.—The patient died suffocated, the tube

having been removed to be changed, and its reintroduction being difficult, or at any rate not accomplished in time.

Post-mortem examination showed that the growth had extended "over the orifice of the larynx down upon the anterior wall of the pharynx, as far as the lower edge of the cricoid cartilage, and presented a moderately elevated, flattened tumour, of a grayish colour and firm consistence, with well-defined edges. It appeared to be deposited in the submucous cellular tissue in small agglomerate lobules. The entire cavity of the larynx was invaded by gangrene which had destroyed the morbid growths formerly occupying it, and had exposed the cartilaginous walls in a state of necrosis. The arytenoid cartilages had disappeared, and a small portion only of the epiglottis remained. The circumference of the growth which had escaped gangrene presented a thickened callous everted margin resembling the edges of a scirrhus ulcer.

This doubtless was a case of epithelioma or some allied form of malignant disease.

It is worthy of note that the patient was more relieved by the operation than she would have been by a simple tracheotomy, inasmuch as she was enabled to speak better, and also to breathe to such an extent through her larynx as to allow her to take snuff up through her nostrils, which luxury she esteemed highly.

CASE 24.—*Epithelioma : Tracheotomy ; Thyroid and Cricoid Cartilage, &c., divided ; Partial removal of the Growth. Temporary benefit ; Voice good for some months ; Death twelve months after the Operation from extension of the Growth.*

(' British Medical Journal,' 30th September, 1865. Sir D. Gibb, M.D., and C. Holthouse, London.)

A female, æt. 29, came under observation 16th March, 1864. During two years her voice had been hoarse or lost altogether. "The breathing had been obstructed during two months. Efforts at speaking caused pain." At night

there was cough. "The right wing of the thyroid cartilage had been swollen and decidedly prominent, and somewhat indurated and painful for five months. Laryngoscopic examination showed "a large furrowed and lobular growth with irregular outline, of an ashy gray colour, springing from the root of the epiglottis, extending to the right side of the larynx, involving the false cord and covering the whole of the true vocal cord, as well as the anterior part of the left true cord." "Phonation was tolerably fair, though hoarse."

On 29th March a small portion was removed by means of the wire *écraseur*. Some relief followed. Further attempts to remove more were unsuccessful.

12th April.—Dyspnœa being urgent tracheotomy was performed by Mr. Holthouse.

On the 20th April, chloroform having been administered, the original incision for tracheotomy was extended upwards by Mr. Holthouse, by means of a scalpel and scissors, through the cricoid cartilage, the crico-thyroid membrane and the thyroid cartilage. By the nail of the index finger introduced through the wound and curved scissors Sir D. Gibb removed the growth. It was soft, friable, and vascular in some parts, firm in others. The wound was closed by sutures.

Microscopical examination showed the tumour to be differently constituted in different parts. One part consisted of "thickened mucous membrane with sessile cauliflower growths." "Another of dense fibrous tissue with minute extravasations of blood; the third of soft friable matter. Structurally the first represents compound warts; the second nucleated fibre (fibro-plastic or muscular) tumours; and the third the transition of a simple epithelial into a cancerous epithelial growth." (Dr. Andrew Clark.)

No untoward result followed. Five days after the operation the patient was sitting up. On the fourteenth day she was comparatively well.

10th May.—Laryngoscopic examination showed "the larynx to be free from the presence of any growth. The

surface of the mucous membrane, however, was rough, and the right vocal cord was seen to be congested and irregular at its anterior third."

In June the swelling over the right wing of the thyroid inflamed and suppurated.

At the end of August there was some dysphagia, and there was pain running up either side of the neck. Laryngoscopical examination showed recurrence and spread of the growth. "The voice, heretofore distinct, was now a rough loud whisper." The symptoms gradually increased in severity; and the swelling became considerably greater, and the induration more marked and extensive.

By the 10th December she had entirely lost her voice and was reduced to writing to express her wishes. Subsequently some degree of improvement took place, and then again an increase of all the unfavorable conditions. Bronchitis occurred towards the end of January, 1865. Towards the last not only was the larynx completely blocked up by the recurrence of the disease, but the pharynx at its lower part became affected to such an extent as to produce almost complete obliteration of the passage, and a few drops of water were only got down with great difficulty.

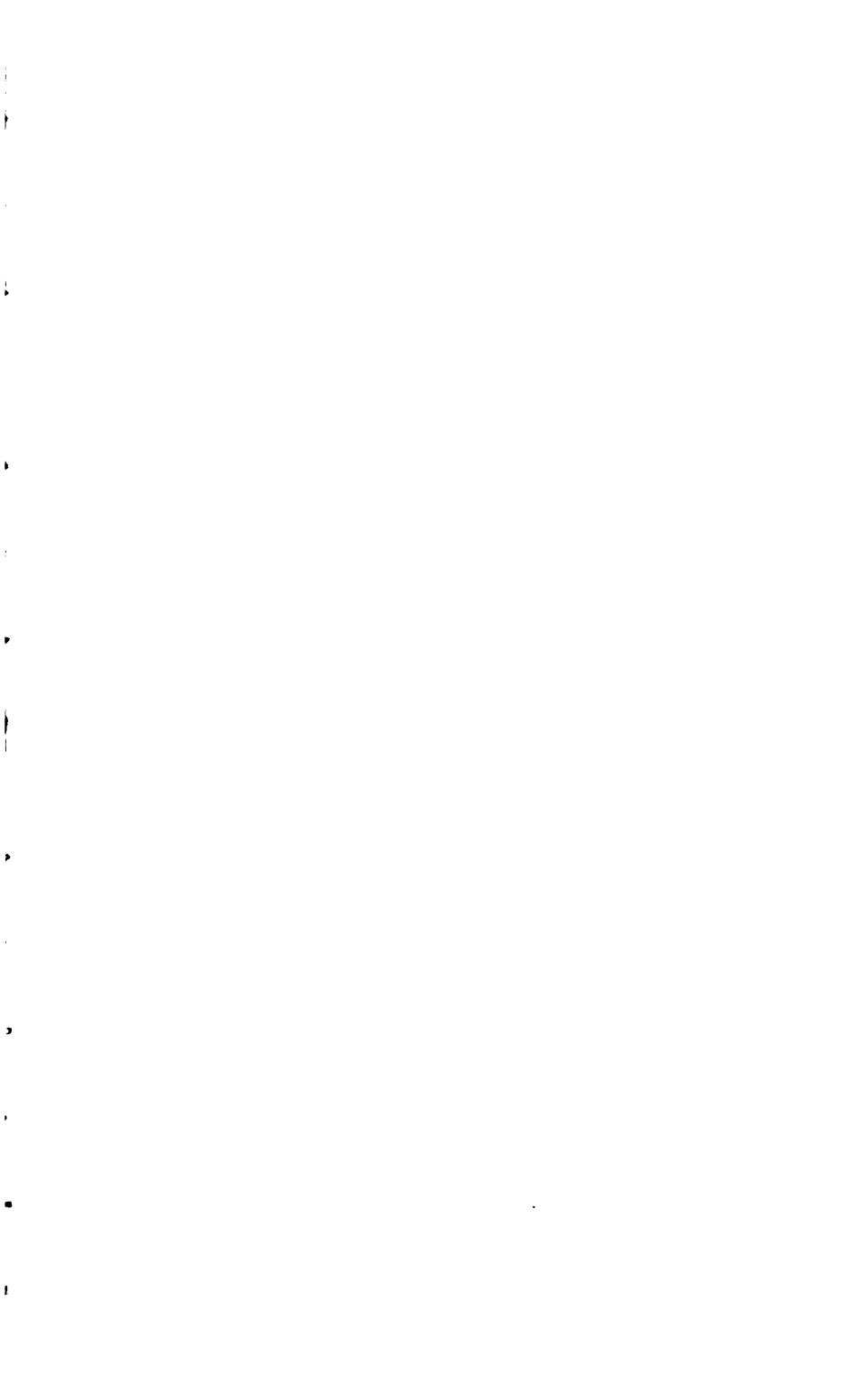
Death occurred on the 7th April, 1865, just a twelve-month after the operation.

The canula in this case was retained throughout.

CASE 25.—Malignant Epithelioma; Tracheotomy; Thyrotomy; Growth partially removed; Canula persistently worn. Temporary benefit; Recurrence and spread of Growth; Death seven months after the Operation.

('Growths in the Larynx,' by M. Mackenzie, M.D., London, 1871, p. 183. Mackenzie and Wordsworth, London.)

John S—, æt. 47, came under observation on 18th September, 1869. During the previous five years his breathing had been short. Four months previously he had been alarmed by violent attacks of suffocation coming on during the night. These attacks became more



frequent. A month later his voice became hoarse; also violent paroxysms of cough occurred. There was slight difficulty in swallowing. Laryngoscopic examination showed "a red cauliflower-like growth the size of a cherry projecting from the right vocal cord; the mucous membrane generally was congested and relaxed." Unsuccessful attempts were made to remove the growth through the mouth. On the third occasion a portion about as large as a pea was removed, but the patient suffered so much that he refused to submit to further treatment of this kind. Two days later the patient took cold, and the symptoms became urgent.

3rd October.—Tracheotomy was performed under chloroform by Mr. Wordsworth, and a canula was inserted.

17th October.—The patient did fairly well after the tracheotomy, and a fortnight later a vertical incision was made through the thyroid cartilage, and several large pieces of growth were removed from the larynx. The parts were brought together with silver sutures; the canula was retained.

The wound healed, but the patient continued to wear the canula.

"As the immediate result it may be stated that the dyspnœa entirely ceased, that swallowing was effected with ease, and the voice, though hoarse, became for a short time distinctly phonetic." Attacks of cough continued to occur. At the beginning of December granulations sprang up around the canula, and, spite of treatment, the vegetations increased and spread in all directions.

January, 1870.—Laryngoscopic examination showed some recurrence of the growth.

In the beginning of March the growth was seen to rise above the level of the aryteno-epiglottic folds, and to block up the entire larynx. Frequent attacks of suffocative cough occurred, and during one of these attacks the patient died, on 10th May, 1870.

Post-mortem examination showed "that the whole of the interior of the larynx was blocked up by an enormous

cauliflower excrescence, which extended from the level of the aryteno-epiglottic folds downwards for more than four inches, thus reaching quite an inch below "the tracheotomy opening. The growth also extended along the track of the canula to the outside of the neck, and formed a thick fringe an inch and a half wide round the tracheal opening.

"Microscopic examination illustrated the extreme difficulty of arriving at correct conclusions concerning the histology of these tumours." This growth was at first considered to be a "papilloma;" on another examination "fibro-cellular;" and still later some nested cells (laminated corpuscles) showed it might be "classed in the category of carcinomatous growths, and considered as epithelioma." This conclusion accords with the clinical history.

CASE 26.—Papillary and Cellular Sarcomatous Growth; Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growth partially removed. Little or no benefit; Canula worn until Death, which occurred two years after the operation from gangrene of the lungs, &c.

('Archiv für Klinische Chirurgie. Langenbeck,' v, 228, and viii, 544; 'St. Petersburg Medizin. Zeitschrift, iii, 153, and vi, 43; Planchon, op. cit., p. 66. Rauchfuss, St. Petersburg.)

In 1861 Ranchfuss opened the larynx of a woman with the view of removing an extensive papillary and cellular sarcomatous growth, which was producing very considerable obstruction.

Operation.—The larynx was divided along the middle line, both thyroid and cricoid cartilages being cut through, and the trachea also opened. The tumour was then removed and with it the right true vocal cord, but some portion of the growth was left. During the operation the trachea seemed to be contracted by an affection of the mucous membrane similar to that of the larynx. A tracheal canula was fastened in.

The laryngeal growths soon sprang up afresh. The

patient continued in good health, but continued to wear the canula. Three times in the course of ten months attacks of suffocation came on ; and during these attacks inspection through the tracheal opening, and sounding, gave rise to the impression that the lower part of the trachea was considerably contracted, owing to the swelling up of the mucous membrane. A strong solution of nitrate of silver was injected, and after the pain and distress first produced had subsided the symptoms were ameliorated. Soon after the operation portions of food occasionally escaped through the tracheal canula. The patient continued to wear the tube ; and the growths increased with rapidity and entirely closed the glottis (filled the larynx, &c.). At the end of two years she died of gangrene of the lung.

Post-mortem examination showed a perforation the size of a quill, extending diagonally downwards from the œsophagus into the middle of the trachea. A chicken bone was found in the right bronchus. This perforation was not caused by the tracheal canula. The mucous membrane of the trachea was beset with scar-like bands, between which there were appearances of diverticular extensions, although such did not actually exist.

This case, although unsuccessful so far as the desired result was concerned, shows how comparatively free from danger the operation itself is even when carried so far as to involve the removal of the vocal cord. No particulars respecting the voice are given in Langenbeck's account ; it was presumably entirely lost.

CASE 27. — Papillary Growths ; Tracheotomy ; Larynx opened in Median line ; Growth removed. Result negative ; Case incomplete.

(‘New York Medical Journal,’ May, 1865, quoted from St. Luke's Hospital Records (in Dr. Sand's paper). G. Buck, New York.)

The patient, a man, æt. 25, was first seen in 1861.

Tracheotomy was performed on the 26th November, 1861, for supposed abscess of the larynx.

18th April, 1862.—The larynx was opened by median incision, and a small growth removed, which appeared to be a mass of exuberant granulations that had formed above the opening made for the canula.

The patient recovered (it appears) from the major operation, but was still obliged to wear the canula; and laryngoscopic examination showed marked narrowing of the rima glottidis, as if from previous ulceration.

This case is altogether incomplete and unsatisfactory. It is somewhat curious that Dr. Gordon Buck makes no allusion to it in either of his published papers relative to this operation.

CASE 28.—Papillomata (probably congenital); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed; Canula persistently worn. Result negative; Growth successfully removed, but neither Normal Respiration, nor Voice regained.

(‘Surgical Treatment of Children’s Diseases,’ T. Holmes, 2nd edition. London, 1869, p. 311. T. Holmes, London.)

A girl, æt. 9, was admitted into St. George’s Hospital 28th January, 1867. She had been long under Mr. Holmes’s care for aphonia. Paroxysmal dyspnœa had lately come on, and threatened life. A laryngoscopic view could not be obtained though the child was very docile. All kinds of local treatment were tried.

28th January, 1867.—“The child was brought to the hospital, having been very nearly dead during the previous night; but when seen the breathing was quite quiet, and the lips of natural colour.” In the evening paroxysms of dyspnœa came on, and tracheotomy was performed just above the thyroid isthmus.

6th February, 1867.—On making the preliminary incision, the parts over the larynx were found to be peculiarly

vascular, but the bleeding was pretty well staunched before the larynx was opened. The larynx being fixed by hooks, "a probe-pointed straight bistoury was passed into the slit of the trachea tube, and the incision was carried completely through the thyroid cartilage." "The bleeding that followed was very considerable." The parts were held asunder by hooks, and when the child had partially recovered, and all blood had been wiped away or ejected, chloroform was readministered.

A pendulous growth, projecting into the right ventricle, was seen, about the size and shape of a pea; soft, and springing apparently from over the false vocal cord. The growth was seized and cut off. A remaining portion was removed close to the cord. There was no other distinct growth, "but the whole mucous membrane looked rough and granular." The wound was closed by sutures, and the tube readjusted.

The general progress appears to have been on the whole favorable, but "no power of natural breathing was recovered during about three months passed in the hospital." The tube was experimentally removed for a day or two, but it was found necessary to reintroduce it. Finally, she left the hospital in good health, but still wearing the tube.

At any rate the operation did no harm.

CASE 29.—*Epitheliomata (Benign?), Cicatricial Band uniting the Vocal cords; Other new Growths; Tracheotomy; Thyroid divided; Further proceedings abandoned, it being impossible to remove the Growths; Canula persistently worn. Result negative.*

('Berlin Klinische Wochenschrift,' 7th December, 1868, p. 501.
Navratil, Pesth.

M. D—, a maidservant, æt. 20, was under observation during 1867-8. The early history of the case is not given. It would appear, however, that laryngotomy had been performed some time previously, for the removal of epithelio-

matous growths from the larynx, and that as the result of such operation a cicatricial band was formed stretching across between the vocal cords, adhering to each, and obstructing the passage of air. This bridge-like membrane was repeatedly divided by the knife, and this method proving inefficacious, resort was had to the galvanic cautery, and after two sittings the membrane appeared to be completely destroyed. An inflammatory swelling next appeared unexpectedly in the middle of the larynx; and suffocation impending, tracheotomy was performed. The œdematous portion of the swelling subsided, and in its place an extensive whitish new formation appeared, which proved to be of firm consistency. The galvanic cautery (porcelain) was applied; but only partial destruction of the growth was effected.

After a time Navratil having observed on experimental removal of the canula that a portion of the new growth hung down into the trachea, resolved to open again the larynx, and to remove the whole substance. The situation of the operation (the cicatrix of the incision previously made?) presented a very unsatisfactory appearance. A firm fibrous irregular scar occupied the place of the subcutaneous tissue, and the cartilage was thickened and spongy in texture, bleeding freely; it was ossified in some parts. When the divided halves of the thyroid cartilage were separated, the portions which hung down were easily cut off. The patient was nearly suffocated. Some considerable bleeding took place from a wounded vein; but the tracheal canula was replaced, and the patient gradually recovered, and the bleeding was arrested. It now, however, became manifest that the new growth so intimately involved the whole larynx, that extirpation was impossible unless the vocal cords and arytenoid cartilages were also removed. The wound was therefore closed, and local antiphlogistics applied. In the course of a few days the wound healed by primary union. The patient was sent home wearing the tracheotomy canula, with which she probably will not be able to dispense.

This case is altogether unsatisfactory. The information

given as to the early conditions and treatment is by no means definite. It would appear, however, that much mischief was done by the attempts made through the natural passages, and that no harm resulted from the abortive attempt to afford relief by opening the larynx and then removing the growth.

CASE 30.—*Papillomata (probably congenital); Tracheotomy; Larynx opened, growths removed; Recurrence; Repetition of the operation. Final result not ascertained; Probable cure; Case incomplete.*

(Dr. L. Voss by private letter submitted to the Society, and by verbal communication to Arthur E. Durham. Dr. L. Voss, New York.)

A boy, æt. 3½, came under observation in 1866, suffering from an affection which was probably congenital, "the boy's voice from his birth never having been right." Laryngoscopic examination by Dr. Simrock showed warty growths in the larynx.

Nov., 1866.—Chloroform having been administered the trachea was opened and a canula introduced. Then the larynx was slit open from the wound upwards, and the growths were removed with scissors and knife. They filled the cavity of the larynx.

The child apparently did well (so I was informed by Dr. Voss), and the wound healed. But the disease returned, and in April, 1867, the operation was repeated. After the cutting instruments had been used for the extirpation of the growths, chromic acid was applied.

7th May.—The wound had nearly healed, and, as Dr. Voss informed me, the patient could breathe perfectly well through the natural passages. He, Dr. Voss, considered the case in every way successful. But, of course, in the absence of further information of precise character it must be considered complete.

CASE 31.—*Fibrous Growth (?) ; Thyroid Cartilage and Thyro-hyoid Membrane divided ; Tumour removed ; Tracheotomy. Death from Pyæmia seven days after the Operation.*

(‘Gazette Hebdomadaire,’ 20th Mai, 1864, p. 347 ; ‘Thèse de Swebel, Strasbourg,’ 1866 ; Planchon, op. cit., p. 54. Debrou, Orleans.)

A man, æt. 52, who came under observation in 1864, had been suffering during six months from increased difficulty in speaking, and swallowing, and even in walking quickly. A rounded tumour as large as a walnut could be seen in the throat. It could be seized with forceps, but the point of attachment could not be determined. The cavity of the larynx was hidden by the tumour.

Operation.—A transverse incision through the thyro-hyoid membrane was first made—this not being sufficient—the thyroid cartilage was incised in the middle line. The tumour was brought into view, and removed by the *écraseur* without any troublesome bleeding. M. Debrou fearing suffocation from possible swelling of the parts, performed tracheotomy, cutting through the three first rings of the trachea without touching the cricoid.

The patient died seven days after the operation. Post-mortem examination showed small abscesses in the bases of the lungs. There was no inflammatory swelling in the larynx.

M. Debrou, probably with reason, attributed the fatal result, not to the operation itself, but to the tracheotomy and the presence of the canula, which, after all, was proved to have been unnecessary.

CASE 32.—*Extensive Carcinomatous Disease ; Thyroid and Cricoid ossified, and divided with difficulty ; Operation abandoned. Death eleven days after from Blood-poisoning,—Erysipelas, Gangrene (Broncho-pneumonia).*

(‘Medizinische Jahrbücher Wien,’ 1869, band xvii, 2nd heft (?), p. 81. Schroetter, Vienna ; Virchow’s ‘Jahresbericht,’ Berlin, band ii, 1870.

W. B—, an inn-keeper, æt. 63, was first seen 29th

December, 1868. A year and a half previously the patient had become hoarse, and in the course of the last two months had begun to suffer from increasing dyspnoea. At length suffocation seemed imminent. Laryngoscopic examination showed that the interior of the larynx was occupied by a morbid growth red in colour and somewhat glandular in appearance. A small triangular gap represented the chink of the glottis. The appearance of the growth and the rapidity of its increase put the diagnosis beyond doubt, although there were no enlarged glands, nor other signs of cachexia. It was pronounced (and ultimately proved) to be epithelial-carcinoma, and the patient was recommended to come into the hospital.

On the 9th January, 1869, an attempt was made to remove the growth, the trachea having been opened and a canula introduced as a preliminary. Great difficulty was experienced in dividing the thyroid cartilage on account of its ossified condition; and when the parts were cut through there was again great difficulty in separating them so as to expose the cavity of the larynx. The growth was found to be so extensive, and so intimately connected with the various structures, that it would have been impossible to remove it without removing the larynx itself (or, at any rate, the greater part of it). The operation was consequently abandoned.

The day after the operation erysipelatous inflammation showed itself about the wound, and gradually spread down the right side of the neck and the right arm. Soon afterwards the parts about the wound became gangrenous, and the patient sank into a state of debility and fever from which he never rallied. He died eleven days after the operation.

Post-mortem examination.—The thyroid and cricoid cartilages were found denuded of perichondrium to the extent of some lines from where they had been cut through. The surrounding parts were sloughy. The growth in the larynx occupied the left half for a space of an inch and a half, and on the right, extended from the vocal cord as far as the first ring of the trachea. There was general broncho-pneumonia

of both lungs. The subcutaneous tissue about the right elbow was infiltrated with matter.

In this case the issue must have been hopeless from the first, and it would probably have been better if the operator had been content to perform a simple tracheotomy. The result, however, so far as the general merits of the operation are concerned, can only be regarded as negative.

It is to this case that Mackenzie gives the reference as that in which he states death to have occurred seven hours after the operation from hæmorrhage.

ON
A CASE
OF
UNILATERAL ATROPHY OF THE
TONGUE.

BY
WM. FAIRLIE CLARKE, M.A. OXON., F.R.C.S.,
ASSISTANT-SURGEON TO CHARING CROSS HOSPITAL, AND TO THE CENTRAL
LONDON OPHTHALMIC HOSPITAL.

Received November 14th—Read November 28th, 1871.

LAST June I had an opportunity of seeing an example of unilateral atrophy of the tongue, and as this is a very rare affection, it may be interesting to the Society if I relate the history of the patient.

In order to add to the value of this communication, as well as to throw light upon the subject, I have placed by the side of my own case two others—the only two that I have been able to find noted in medical literature. The one has been put upon record by Baron Dupuytren, the other by Sir James Paget.

The following are the particulars of the case that I saw, so far as I have been able to obtain them; and though the history is not so complete as I could wish, still even an imperfect record of such a rare affection may not be without its value:

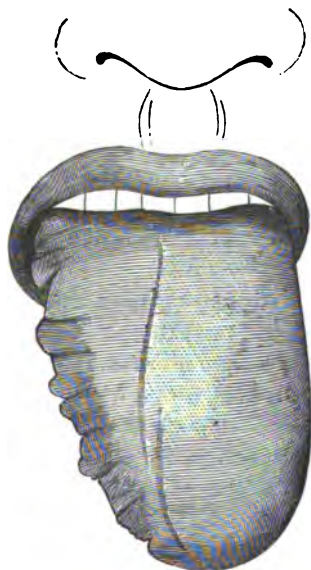
Mrs. H—, æt. 45, the wife of an oilman in the north of London, became aware of a tumour in her right breast in the spring of 1869. Up to this time her health had been good. The menses had ceased two years before. On the 14th of February, 1870, she consulted Mr. Hume, of Devonshire Street, Islington Green, about the tumour in her breast, and he recommended that it should be removed without delay, as it had all the appearance of a malignant growth. The operation was performed on the 16th by Mr. Barwell. The wound healed slowly, but satisfactorily.

On April 15th the patient complained of cough and slight dyspnœa—the latter noticeable only after exercise. Under treatment the cough soon disappeared, but the dyspnœa continued.

On October 3rd Mr. Hume was called suddenly, and found the patient suffering from a deep-seated pain on the right side of the head, of a periodic character, returning each night between 1 and 2 a.m., and rendering her for some hours incoherent and unmanageable. Many remedies were prescribed, but the only thing which gave her any relief was morphia in grain doses. These attacks were accompanied by great turgescence of the vessels on the right side of the neck—a symptom which was partially relieved by the application of leeches to the upper part of the sternum. Subsequently tonics were prescribed, and by the 4th of December the patient was so much better as to require no further attendance. It was at this time that the atrophy of the right side of the tongue was first noticed, though it was not then so marked as it afterwards became.

On March the 29th, 1871, Mr. Hume was again urgently required to attend, and found the patient suffering from all the former symptoms, but in an aggravated degree; and, in addition, there was an alarming dysphagia, together with paroxysms of suffocative cough, which recurred about three times in the twenty-four hours. On being asked to protrude the tongue she always appeared unable to do so at first, and when the request was repeated would reply, "Wait a minute." Then, after a few moments' deliberation, she would put it

out very slowly. The tongue was crimped and puckered along its whole right side from base to apex, but these appearances were most marked in the anterior two thirds; and an actual loss of substance had taken place, so that this half of the organ seemed small and wasted. The loss of substance was bounded exactly by the median raphe, and the contrast between the *plumpness* of the left side and the shrivelled aspect of the right was very striking. The tongue was soft



UNILATERAL ATROPHY OF THE TONGUE.

throughout; there were no hard nodules in it. No alteration was noticed either in the common sensation of the organ or in its special sense of taste. When the tongue was protruded there was no deviation to either side. Articulation was slow and difficult. The patient complained of great pain on the right side of the head and along the right side of the neck. There was some fulness on this side of the neck, but no abnormal growth could be felt and no enlarged glands were apparent. When the patient was asleep her breathing

was stertorous. The chest sounds were normal, but the thorax could not be freely expanded. Along with these symptoms there was general prostration and cachexia.

From this date the patient's condition gradually became worse. The paroxysms of dyspnœa became more frequent and more severe, and the 7th of June, 1871, in one of these paroxysms, she died.

At no time during her illness had she any paralysis of the extremities, and (with the exception of the delirium which accompanied the paroxysms of dyspnœa) her intellectual faculties remained clear throughout her whole illness.

By the favour of Mr. Hume, to whom I am indebted for the foregoing particulars, I had an opportunity of examining the patient's tongue very shortly after her death; and the accompanying outline gives a fair and truthful representation of it, as it had appeared for some months previously. I regret to say that no post-mortem examination of the body was allowed.

Before I offer any remarks upon this case it will be well that I should quote the two examples of unilateral atrophy of the tongue to which I have alluded.

Baron Dupuytren's case, which will be found in the '*Leçons Orales*,' is as follows:—The first part of it is given in the lecture upon "*Dislocations of the Vertebrae*" (for it was regarded as a case of chronic rheumatism of the occipito-vertebral ligaments), and the concluding portion in the lecture upon "*Hydatid Tumours*."¹ As far as possible I have related it in the author's own words.

A man, *set.* 30, a weaver by trade, was admitted into the *Hôtel-Dieu* under the care of M. Dupuytren, about 1830.

Three years before the patient began to suffer from severe pains in the left side and back of the head. These pains prevented him from moving it, and deprived him entirely of sleep. After five or six days they changed their place and became fixed in the upper part of the left side of the neck. From this time they were less violent, but movement still continued impossible.

¹ '*Leçons Orales*,' i, 493, and iii, 361 (first edition).

"These symptoms were soon followed by a slight difficulty in speaking, which increased gradually, so that at the end of two months the patient could no longer make himself heard. He said that the air passed in a whistling manner by the left side of his tongue, and that when he wished to pronounce *je* he said *ze*.

"Some pain was felt at the angle of the lower jaw and in the left cheek, but there was no paralysis of the muscles of this region.

"Another still more extraordinary symptom manifested itself. The left side of the tongue began to diminish in size, and this to such a degree that it became entirely atrophied. This portion of the organ seemed to consist of nothing but folded membranes, which could be rubbed together without feeling any muscles between them. It was like an empty purse. The mucous membrane remained entire, but the muscular tissue beneath it had disappeared. When the tongue was protruded the right side was seen to be well nourished. The atrophy of the left side was greatest in the anterior and middle portions, and was least at the base.

"It also seemed that the right side had acquired more strength. When the tongue was put out this side was curved, either because of its superior strength or because it was no longer supported by the left side. During the first months the patient had been entirely deprived of speech, but when he was examined by M. Dupuytren he spoke as if his tongue were not in the slightest degree wasted. He expressed himself clearly and distinctly." "But to be able to articulate sounds he had needed practice and careful study. The favorable result was due rather to exercise than to any diminution of the disease."

During the time that the patient remained in the Hôtel-Dieu M. Dupuytren made careful observations with regard to his sense of taste, and ascertained that it was not at all impaired.

His intellectual faculties were never in any degree affected, nor had he any paralysis of the extremities.

So much for the state of the patient at the time he was

first examined. At a later date M. Dupuytren gives us the rest of his history.

"When that man left the Hôtel-Dieu he had paralysis of the left side of the tongue which had determined the atrophy of that part; but he preserved the sense of taste, which made me think that the lesion bore upon the great hypoglossal nerve. Nearly two years passed without my hearing anything of him, when I learnt that he had gone to die at the hospital Cochin. Dr. Gendrin, who was kindly desirous of giving me information about the patient, told me that he preserved his intellectual faculties almost up to the last moments of his life. The paralysis of the left side of the tongue and the atrophy was even more marked than at the time he left the Hôtel-Dieu; the sense of taste had slightly diminished on the affected side, but nevertheless it remained. The patient said that his generative functions were very weak. Some days before his death, symptoms of compression showed themselves and the patient succumbed. At the autopsy, which was made with care, a great deal of serosity was found in the ventricles; but what is the most remarkable is that a large number of hydatids were discovered at the base of the cerebellum; one of these hydatids had introduced itself into the anterior condyloid foramen, and compressed, in the most evident manner, the great hypoglossal nerve."

The following is Sir James Paget's case, which will be found in the 3rd vol. of the Clinical Society's Reports:

"H. G—, 27 years old, a dairyman, was admitted into St. Bartholomew's Hospital on June 10th, 1869.

"Six years before admission he fell heavily on the back of his head. He was not stunned, but the injury was followed by constant pain and stiffness about the back of the head and neck. Ten months after the fall, an abscess formed and discharged at the back of the head. The stiffness and very free discharge had existed ever since. A fortnight before admission he noticed that his tongue, when protruded, was directed towards the right. His general health had never been severely disturbed.

"He was a healthy-looking man, except from the stiffness of his neck, which was nearly complete. In the scalp, over the occipital bone, numerous sinuses led to dead and bare bone, and to cavities containing pus, some of which extended over the upper cervical vertebræ. The integuments were thick and tough, infiltrated, and, where not undermined with pus, adherent to the subjacent textures.

"The speech was thick and slow. The muscles of the right side of the tongue were exceedingly wasted. This half of the tongue looked less than half as large as the left; it was collapsed, wrinkled, soft, sunken, like a tongue with wasting palsy, and the muscles of its left side alone appeared to act. Its sensations were unimpaired."

"I removed," says Sir James Paget, "all the dead portions of bone that I could find. They were derived from the posterior and lower part of the occipital bone, some including the whole thickness of the bone, so that the dura mater below the lateral sinuses was exposed, in a space of rather more than an inch in diameter. One of the portions of dead bone included the posterior third of the border of its foramen magnum; another contained the right posterior condyloid foramen."

"The patient recovered from the operation without hindrance, and in a month nearly all the sinuses were healed, and no dead bone could be felt. A few days after the operation the wasted part of the tongue began to grow larger, and within a month it had nearly regained its former size and muscular power.

"Six months after the operation the patient was in good health. Nearly all the sinuses were healed. The tongue was still inferior in both texture and size on its right side, but the difference was comparatively slight; and when put out the tip went but little over to the right side. The rotatory movements of the head were nearly free; the bending movements much less so."

"The case," adds Sir James Paget, "scarcely needs comment. It is very rare as an instance of necrosis involving the border of the foramen magnum, and not attended by

grave cerebral or spinal disturbance. But its chief interest is in the wasting of the muscles of half the tongue—a wasting so rapid that it may be ascribed to some morbid condition of the hypoglossal nerve or of filaments enclosed in it, and as rapidly recovered from when the morbid condition was brought to an end by the removal of the dead bone.”

Remarks.—In these two cases the cause of the unilateral atrophy was ascertained beyond a doubt. In Dupuytren’s case it was demonstrated by *post-mortem* examination; in Paget’s case it was proved by the history of the illness and by the fact that recovery took place when the dead bone, which gave rise to it, was removed. But in my case the evidence is not so complete. Unhappily no autopsy could be obtained. We can, therefore, only infer the cause of the wasting. However, looking at all the circumstances, I think there is good reason to suppose that it depended upon the involvement of the right hypoglossal nerve in a secondary cancerous growth, either inside the cranium or at the upper part of the neck. The facts which lead me to this conclusion are—the existence of an undoubted cancerous tumour, which was removed sixteen months before death, after it had been growing about a year; the general cachexia; the intense and deep-seated pain on the right side of the head and neck; the fulness and turgescence of the vessels on the right side of the neck, denoting an obstruction to the circulation; the frequent attacks of dyspnoea and dysphagia, which probably depended on pressure upon the pneumo-gastric and glosso-pharyngeal nerves. These symptoms, together with the absence of paralysis of the extremities and the clearness of the intellect, seem to indicate that the disease was not in the brain or medulla oblongata, and make it probable that there must have been an adventitious growth pressing upon, and destroying the function of, the right hypoglossal nerve, and implicating, more or less, the pneumo-gastric and the glosso-pharyngeal nerves as well. Such a tumour might be seated either inside the cranium, so as to bear upon the

,

>

1

,

1



roots of these nerves where they come off in close juxtaposition from the medulla oblongata; or just outside the cranium, so as to involve the hypoglossal nerve where it emerges from the anterior condyloid foramen, and where it is intimately associated with the glosso-pharyngeal and vagus nerves, or possibly in both these situations at the same time; indeed, the analogy of the cases I have quoted would lead one to say that the hypoglossal nerve may not improbably have been compressed in the anterior condyloid foramen itself.

I am well aware that the evidence I have adduced in favour of a secondary cancerous tumour is not conclusive. It falls far short of the demonstration which an autopsy would have afforded. Still, though the cause of the unilateral atrophy must be admitted to be unproven, the fact of the remarkable appearance of the tongue remains; and that is the point to which I desire to direct attention, and which forms the proper subject of this communication.

But, it may be asked, what reason have we to believe that this wasted condition of the tongue depends upon a lesion of the ninth nerve? Is there any direct proof to show that if the right hypoglossal nerve were thus compressed or destroyed by an adventitious growth, so that its functions were suspended, we should find the right half of the tongue atrophied? To this it may be answered that the ninth nerve has been frequently divided, and that the result has been to produce atrophy of the tongue upon the same side. It is a nerve which may easily be reached underneath the jaw, where it lies between the tendon of the digastric and the hyoid bone; and it has been often made the subject of experiment. Romberg in his work on the 'Nervous Diseases of Man,'* in speaking of the hypoglossal nerve, says, "Atrophy follows paralysis in the muscles of the tongue more rapidly than in other paralysed muscles. Bidder always found that the nutrition of the tongue was impaired during the first week after the division of the hypoglossus, in living dogs, though in no case a vessel of any magnitude had been injured.

* Sydenham Society's 'Transactions,' vol. ii, 304.

Large and deep transverse rugæ were visible on the surface of the tongue, as if the envelope of the organ had become too loose for its fleshy contents; a manifest difference was perceptible between the two halves."

This affection, then, of the tongue is an example of the large class of muscular atrophies which depend upon the lesion of nerves, and the impairment of nervous functions. The hypoglossal nerve being injured there follows a paralysis of the corresponding side of the tongue, and the muscles which are thus deprived of their contractile power rapidly waste, notwithstanding that they may be kept in constant movement by the muscles of the unparalysed side. But it is the rarity with which this disease occurs, the nicety with which the atrophy is bounded by the median raphé, and the fact that it depends, not upon central but upon intermediate disease—disease which in some cases at least is capable of removal—which gives it a peculiar importance and interest.

Appendix.—In order to test for myself the effect of a lesion of the ninth nerve, I performed the following experiment upon a rabbit. On the 25th of October (1871), with the assistance of Dr. William Ogle, I divided the right hypoglossal nerve, and removed a piece about a quarter of an inch in length.

The nerve was reached with very little difficulty, beneath the angle of the jaw, where it lies above the hyoid bone and below the tendon of the digastric muscle. The portion removed was situated in front of the descendens noni and thyro-hyoid branches, but behind those which are distributed to the stylo-glossus, the genio-hyoid, the hyo-glossus, the genio-hyo-glossus and the intrinsic muscles of the tongue.

Immediately after the operation, when the tongue was protruded, it was turned strongly towards the right, as if the animal were licking the right corner of its mouth. The wound completely healed in a few days. The rabbit was examined from time to time, and on each occasion its tongue was invariably put out towards the right side.

Yesterday, November 27th, that is to say, thirty-four days after the operation, the rabbit was killed, and the accompanying preparation shows the state of the hypoglossal nerve and of the tongue. The skin, including the cicatrix, could be raised with ease. There was no matting of the subjacent tissues, so that the different parts at the seat of the operation could be clearly discerned. The divided nerve was found to have united by what appears to be a soft semitransparent substance, which is pink and highly vascular, and twice as thick as the ordinary calibre of the nerve. No very marked change is apparent in the tongue, but the middle third, or perhaps rather the posterior half, is somewhat wasted and flattened.

Postscript.—When the rabbit's tongue had been hardened in spirit, and a transverse section of it was made, the atrophy of the right side was very marked—indeed this side of the organ was not above half the size of its fellow.

In the discussion which followed the reading of this paper other recorded cases of a somewhat similar kind were mentioned. (1.) Mr. Holthouse, in his work 'On Squinting and Paralytic Affections of the Eye,' narrates a case of "Paralysis of the sixth and ninth cerebral nerves of the left side, of syphilitic origin, producing inversion of the left eye and wasting of the left half of the tongue." (2.) Dr. Hughlings Jackson relates two cases in which, among other symptoms, the ninth nerve was paralysed. 'London Hospital Reports,' vol. i (1864), p. 361, vol. iv (1867), p. 315. (3.) In the 'Encyclopædia of Anatomy and Physiology' (art. Tongue), Dr. Hyde Salter alludes to a case which occurred in the practice of Dr. W. Budd. A man was stabbed in the neck—the wound dividing the external carotid artery and the hypoglossal nerve on the left side. The artery was secured, and the patient recovered with palsy of the left side of the tongue. At the end of some weeks that half of the tongue was much wasted, and all the movements of the organ were performed by the other half. The atrophy was confined to the muscular element of the organ; taste and

touch remaining unimpaired. (4.) A case, which is very analogous to that which forms the subject of this paper, is related by Dr. Habershon in the 'Medical Times and Gazette' for February 9th, 1867.

THE
PATHOLOGY OF SCARLATINA,
AND THE RELATION BETWEEN
ENTERIC AND SCARLET FEVERS.

BY
JOHN HARLEY, M.D. LOND.,
LATE PHYSICIAN TO THE LONDON FEVER HOSPITAL; ASSISTANT PHYSICIAN
AND LECTURER ON PHYSIOLOGY AT ST. THOMAS'S HOSPITAL.

Received November 28th—Read December 12th, 1871.

THE pathology of scarlatina is so neglected a subject that no connected account of it exists in medical literature. The opinion of modern writers appears to be that the morbid anatomy of scarlatina is that common to febrile diseases. Here and there a statement with regard to a particular organ or condition may be found; but some of these statements, as may be inferred from the sequel, are not in accordance with the facts herein narrated. I propose, therefore, to give, in the first place, a description of the morbid appearances which I have observed in forty cases of scarlet fever. Of these I find that twenty-eight will be sufficient to illustrate the subject. The date of death is the only circumstance which has influenced me in the selection of these cases, my desire being to give a consecutive history

of the progress of the morbid changes from day to day. The most fatal period is from the third to the sixth day, and I have thought it desirable to use repetition in cases of death during this interval. The remaining cases, which are not recorded in this communication, agree in every particular with those adduced.

I know of no disease in which the morbid effects are more uniform, and I can truly say of all my cases "ex uno disce omnes," so invariable are the essential lesions. As will be seen from the sequel, scarlatina is essentially a disease of the lymphatic system; it is attended with inflammatory action of this system of glands, in which I include the spleen, the mesenteric glands, the tonsils, and the solitary and agminated glands of the intestines; and the essential lesions of scarlatina are those which result from this inflammatory action. Other, and it may be secondary lesions have reference to the condition of the blood and the bile.

The second part of this communication contains a record of those cases in which I have observed the primary inflammation of the intestinal, and sometimes of the other glands, pass into the ulcerative stage, and so lead to the development of enteric fever as a sequel to scarlatina.

It is to this first part of my subject, viz., the pathology of scarlet fever, that I first solicit attention. The facts are included in Cases 1 to 28, and only the necessary details are given.

CASE 1. Death on the third day of scarlatina; general inflammation of the mesenteric and Peyerian glands; psorentery.—Elizabeth P—, æt. 22, died of delirium and diarrhœa. The scarlet rash appeared on the second day, and was copious and livid; the throat affection was severe, and the glandulæ concatenatæ of the neck swollen. A sister was ill of scarlatina at the same time, and recovered. The post-mortem examination was made a few hours after death. The right cavities of the heart were distended partly with dark fluid blood (temperature 98° Fahr.), but chiefly with large, firm, adherent, and entangled colourless clots, which passed into

the pulmonary artery and superior cava, and branched for a considerable distance within them, nearly obliterating their channels. The left ventricle contained a similar clot of moderate size, entangled with, and adherent to, the cordæ tendinæ. It was continued into the aorta, and branched into the arteries of the arch. The spleen and mesenteric glands were swollen and dark coloured. The agminated glands, as high as the duodenum, were swollen and purple; two of the larger patches, about eighteen inches from the valve, were much raised, of a blood-red colour, and appeared to be abraded. The solitary glands were swollen, prominent, and of a yellowish colour, so that the lower third of the ileum appeared as if uniformly sprinkled with grains of sago. "Psorenterie" is the term used by French writers to denote this condition. The mucous membrane of the small intestine was completely injected, and of a bright rose colour.

CASE 2. Death on the third day of scarlatina; general inflammation of the mesenteric and intestinal glands.—Caroline D—, æt. 6, sister to H. D— (see Case 7), died comatose. The body was well nourished, and blotched with a scarlet rash. The glands of the neck were a little swollen. Excepting the apex, the right lung was increpitan, fleshy, flabby, friable, and bound to the chest wall by old adhesions. The heart contained only soft blood clots; the gall-bladder was full of thick dark sap-green bile, neutral, sp. gr. 1032, giving with Pettenkofer's test a rich and permanent purple. 1000-gr. measures yielded, at 212° Fahr., eighty grains of almost black brittle extract of strong fatty odour. Spleen three and three quarter ounces, firm. Mesenteric glands swollen to the size of marbles, and making a heavy lobulated mass of the mesentery. The small intestine was in the same condition as that of her sister (Case 7), the agminated glands being vividly injected, and swollen from the jejunum downwards, and there was general psorentery. The mucous membrane of the colon was of a pale rose colour, and the solitary glandulæ, from the cæcum to the left bend of the colon, were enlarged, red, and prominent.

CASE 3. *Death on the fourth day of scarlatina; general inflammation of the mesenteric and Peyerian glands; psorentery.*—Emily H—, æt. 11, died comatose. There was diarrhœa on the second day. Glands of the neck enlarged. The right cavities of the heart, and the large vessels connected therewith, blocked with firm yellow clots, as in the preceding case. The gall-bladder full of pale, watery, orange-tinted bile. The spleen and mesenteric glands moderately swollen; some of the latter purple. The blood-vessels of the lower third of the ileum were completely injected, and the agminated glands of this portion of the bowel swollen and inflamed, those near the valve being furnished with cockscomb-like processes. The solitary glands were all swollen, forming white hardish eminences about the size of hemp-seeds; general psorentery.

CASE 4. *Death on the fourth day of scarlatina; general inflammation of the mesenteric and Peyerian glands; psorentery.*—John F—, æt. 5, died rather unexpectedly of oppressed breathing and failure of the heart's action. Autopsy three hours and a half after death. Skin discoloured with fine and coarse dark purple spots, almost confluent in the groins and on the sides of the body. Temperature, under the liver, 100·9° F. The right cavities of the heart contained colourless entangled clots branching into the lungs and neck. Bile abundant, watery, of a greenish-yellow tint. Spleen three ounces and a half. The mesenteric glands, and the agminated glands of the ileum, from the jejunum downwards, were purple and swollen; the solitary glands in the condition of general psorentery, and rough to the touch. The solitary glands of the large intestine were swollen and purple.

CASE 5. *Death on the fourth day of scarlatina; general inflammation of the mesenteric and Peyerian glands; psorentery.*—George B—, æt. 30, died delirious and prostrate; the body was fairly developed; the skin mottled with a lobster-red, becoming purple about the shoulders, and on the sides of the chest and loins. Heart-clots as in the previous case.

Gall-bladder collapsed, pale, and contained only a drachm of clear, watery, orange-coloured, non-alkaline bile. Spleen turgid and enlarged. Mesenteric glands turgid, many as large as French beans, generally pale. The lower part of the ileum was purple externally, pale internally. All the Peyerian glands were pale, swollen, abruptly prominent, and spongy-looking, and the whole of the solitary glands greatly enlarged, and in the condition described in the former case.

CASE 6. Death on the fourth day of scarlatina; general inflammation of the mesenteric and intestinal glands; moderate psorentery.—Charles S—, æt. $10\frac{1}{4}$, died of exhaustion on the fourth day of very severe scarlatina. The rash was very intense, the whole skin being of a fiery damask-red colour. The body was well nourished, and the skin discoloured with fine purple spots and blotches. The heart was not examined; the kidneys were congested; the gall-bladder contained two ounces and a quarter of dark greenish-brown bile, very slightly ropy, neutral; sp. gr. 1013·2, giving a reddish-purple colour with Pettenkofer's test 1000 grain measure yielded, at 212° Fahr., 36·4 grains of dark greenish-brown extract. Spleen four ounces and a half, almost as firm as liver. The mesenteric glands were turgid and purple, or pale, and greatly enlarged, so as to convert the mesentery into a large thickened lobulated mass, some of the glands being as large as a pigeon's egg. The lower portion of the ileum was purple, and Peyer's patches in the last six inches were greatly swollen and injected, forming cockscomb-like folds; above this they were merely swollen and spongy, as in the first stage of enteric fever. Besides this there was general psorentery, but the glands were not so much swollen as in the preceding two cases. The cæcum was severely congested, and the solitary glands of the colon were swollen and prominent, a portion being of a purple colour.

CASE 7.—Death on the fourth day of scarlatina; general

and severe inflammation of the mesenteric and intestinal glands.
—Henrietta D—, æt. 8, sister to C. D. (see Case 2), died of failure of the heart's action. The dead body was covered with a livid scarlet rash, and the glands of the neck were slightly swollen. The right cavities of the heart contained entangled, colourless, and soft dark clots. The bile was abundant, and had the same characters as that of her sister (see Case 2). The spleen weighed three ounces, and had a depressed white cicatrix, the size of a sixpence, on the centre of the outer surface. The mesenteric glands were much swollen, round, and purple, and the whole mesentery was completely injected, purple, and so greatly thickened as to resemble a large half-filled bag of large and small marbles. The intestines were empty; the mucous membrane of the lower third of the ileum was deeply injected, and covered with a dusky green adherent slimy ooze. The agminated and solitary glands throughout were greatly inflamed and swollen, of a purple-rose or deep claret colour, always darker than the surrounding mucous membrane, above which they were elevated one sixth of an inch. Those nearest the valve were most severely affected. The ascending and transverse portions of the colon were injected, and the glandulæ swollen and more deeply injected.

CASE 8.—*Death on the fifth day of scarlatina; general inflammation of the mesenteric and intestinal glands, with psorentery.*—Rosa B—, æt. 2½, died of failure of the heart's action, with large buboes on either side of the neck. The dead body was covered with a dusky scarlet rash; the right cavities of the heart were distended with soft, chiefly colourless clots, which were continued into the larger vessels and their primary branches. The gall-bladder was full of greenish, watery bile. The spleen weighed two ounces and a half, and was of a firm consistence. The mesenteric glands in connection both with the large and small intestine were much swollen, some of those about the junction of the two tubes being as large as walnuts. The whole of the glands of the small intestine, from the jejunum downwards, were swollen

and prominent, the solitary glands being in the state of general psorentery (as in Case 1), giving the mucous membrane a roughly granular feeling; some of the latter were beginning to soften at the summits, and presented an abraded appearance. The agminated glands were much injected and angry looking, being raised the eighth of an inch above the pale mucous membrane surrounding them. One patch, a foot from the valve, was in a more advanced stage, and almost bleeding. The appearance of the open intestine was striking, the mucous membrane generally being everywhere naturally pale, and so bringing the red raised Peyer's patches into strong relief, and the intervals between these in the last three feet of the bowel being thickly strewn with the prominent straw-coloured solitary glandulæ.

CASE 9.—*Death on the fifth day of scarlatina; general but moderate inflammatory swelling of the mesenteric and intestinal glands.*—Walter N—, æt. 17, died delirious and prostrate. The body was well developed but spare, and the cutaneous affection had been so severe that the epidermis was abraded from the scrotum, elbows, and nates. The gall-bladder was full of ropy greenish-brown bile, muddy from epithelial *débris*. On standing it became clear, and of a pale glaucous colour, like some specimens of urine. It was neutral, of sp. gr. 1013·2. Pettenkofer's test gave the faintest brownish-purple tinge, which did not interfere with the transparency of the mixture and soon disappeared. 1000-grain measures yielded by the water-bath 31·2 grains of brittle residue of fatty odour and dingy gamboge colour. The spleen weighed twelve ounces; it was palish-purple, firm, and turgid. The mesenteric glands and mesentery generally were greatly congested, the glands being enlarged, spherical, and purple. The transverse colon contained healthy-looking fæces nearly formed; a few of its solitary glands were enlarged, and some of them purple. The mucous membrane of the ileum, excepting the last four inches, was of an uniformly dusky purple colour. There was general psorentery. Peyer's patches partook of the general and severe congestion, and were

slightly swollen. Those of the last four inches of the bowel were pale, like the mucous membrane.

CASE 10.—*Death on the fifth day of scarlatina ; general inflammation of the mesenteric and ileal glands.*—Joseph S—, æt. 45, died of exhaustion. The body was finely developed, and the skin discoloured with dusky purple blotches and spots. The gall bladder was empty and contracted, the mucous lining injected and red, and moistened with a few drops of colourless, alkaline, mucous fluid. The spleen seven ounces, and soft. The mesenteric glands purple, turgid, and as large as filberts. The bowel contained a little light ochre-coloured fluffy fecal matter. The ileum was purplish externally and pale internally. The solitary glandulæ were in the state of general psorentery. Peyer's patches were not so much affected, being pale and only a little more prominent than in health, excepting, however, three within two feet from the valve, which were considerably raised and injected.

CASE 11.—*Death on the sixth day of scarlatina ; general inflammation of the mesenteric and ileal glands.*—William S—, æt. 4, died from progressive failure of the heart's action. The abdomen was tympanitic before death. The body was well nourished. The right heart contained fluid blood and very firm colourless clots branching away into the great vessels. The gall bladder contained half an ounce of watery fluid, turbid from epithelial *débris*. On standing it had the appearance of pale urine. The spleen was swollen ; the mesenteric glands large, turgid, and purple ; the intestines were distended with air, and empty of solid matters. In the ileum there was general psorentery, and Peyer's patches were red and swollen, many raised the one eighth of an inch above the mucous membrane, with the paleness of which they were in strong contrast.

CASE 12.—*Scarlatina ; death on the sixth day ; severe inflammation of the mesenteric and ileal glands.*—William

C—, æt. 19, was admitted on the fourth day of a very severe attack. The rash was abundant and dusky; pulse 124, and very weak; tongue dry and brown; the throat affection moderate, and the glands of the neck only slightly swollen, and there was delirium. The skin was discoloured by a raddle-coloured patchy rash. The veins of the heart were enormously congested with very dark blood, and the *left* auricle was distended with equally dark, softly clotted blood. The left lung was collapsed, and adherent by old membranes to all parts of the chest walls. The right lung was congested; the kidneys were healthy; the spleen weighed ten ounces and a half; it was pale, and of natural consistence. The mesenteric glands were greatly enlarged, some the size of pigeons' eggs, and purple. The intestines were injected, Peyer's patches were very vascular, the turgid vessels having a whipcord appearance; the ridges were greatly swollen, producing a deep alveolation, and some ridges were raised into red tongues a quarter of an inch in length. This was the condition throughout the lower third of the ileum. A few of the solitary glands were swollen, and two of them formed bright damask-red, angry-looking elevations. The large intestine was healthy.

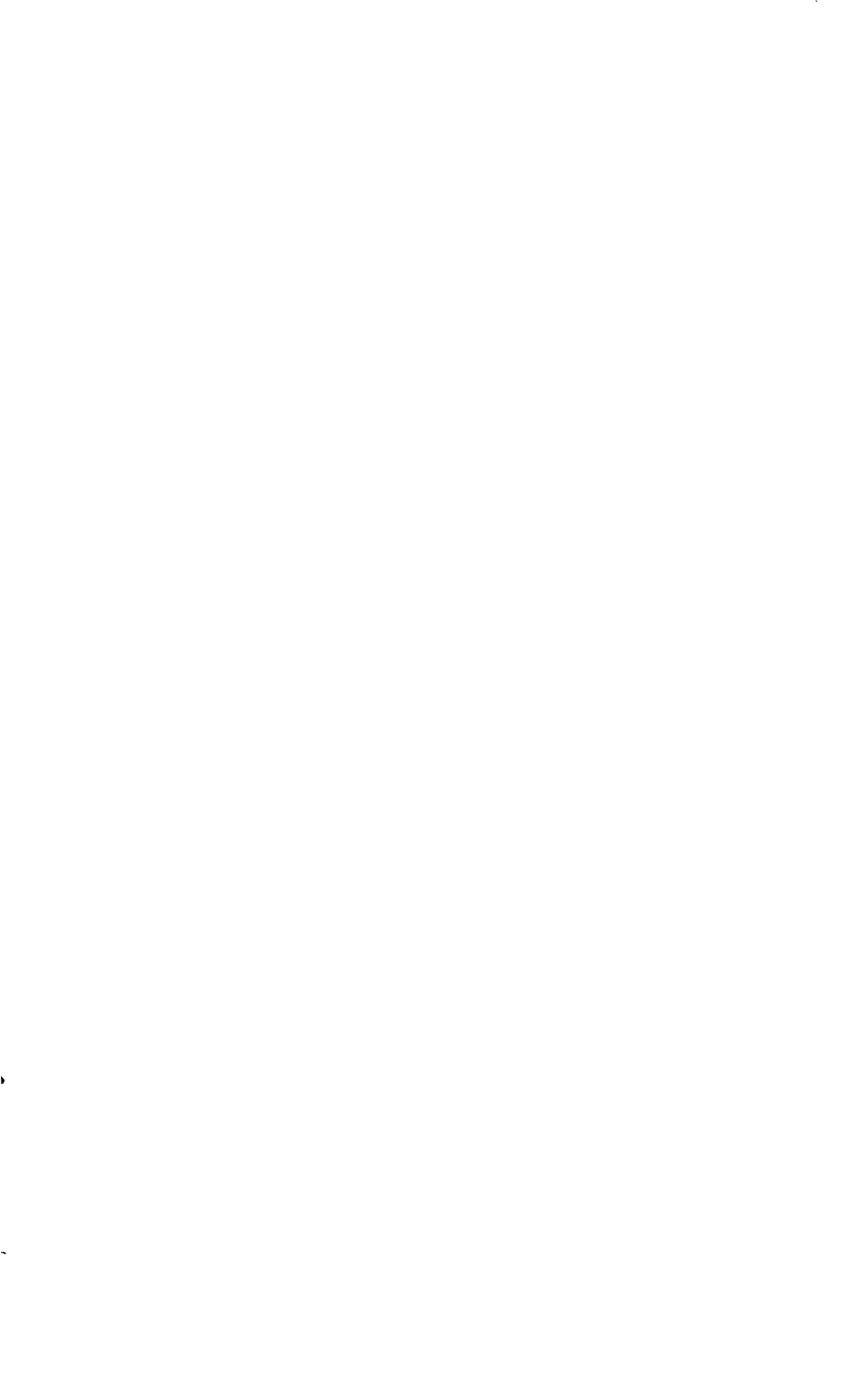
CASE 13. Death on the seventh day of puerperal scarlatina; general inflammation of the mesenteric and ileal glands.—Sarah L—, æt. 18, died the eighth day after delivery of a healthy child. Death was preceded by delirium, slight strabismus, scanty and foetid lochial discharge. The uterus weighed twenty ounces; the cavity was filled with viscid blood clot and a small portion of firmly adherent placenta. It exhaled a foetid odour. The mesenteric glands were slightly swollen. The intestines contained a moderate quantity of natural faecal matter. The mucous membrane of the ileum was pale. Peyer's patches throughout were raised above the level of the mucous membrane, their ridges were elevated and swollen, so as to give them a spongy appearance; those about the middle of the bowel were injected. The solitary

glands were more considerably swollen and many of them congested.

CASE 14. Death on the eighth day of scarlatina ; severe inflammation of the mesenteric and ileal glands.—Francis S—, æt. 17, died in a typhous condition. The body was finely developed, the skin discoloured with a livid scarlet rash, and the epidermis separated from the parts exposed to friction, and in other parts raised into minute vesicles containing milky serum. The lungs were deeply congested, and there were points of ecchymosis on the pleural surface. Patches of ecchymosis were also present on the parietal pericardium. The right heart was enormously distended with colourless clots which branched far away into the lungs and neck. The gall-bladder was full of healthy-looking but watery bile. The spleen weighed twelve ounces, and was dark and soft. The mesenteric glands were swollen, turgid, and purple. The ileum contained some fluid, shining, dark-green, fæcal matter. The lower portion was severely congested, and there was general psorentery, and inflammatory swelling of all the Peyerian glands, some of which were prominent and almost bleeding.

CASE 15. Death on the ninth day of scarlatina ; general inflammation of the mesentery and glands of the ileum.—Mary —, æt. 2, died of severe glandular and cellular inflammation of the neck. For some days before death deglutition was impossible from swelling of the tonsils and fauces. The deeper cervical glands and the left tonsil were in a state of suppuration ; the follicular glands at the base of the tongue swollen. The spleen weighed two ounces and three quarters. The gall-bladder was injected and of a rosy tint ; it contained half an ounce of watery fluid, resembling pale urine in appearance. The mesentery was everywhere greatly thickened and purple from the presence of dark, turgid, spherical glands, the average size of which was that of a hazel nut. The intestine contained some fluid fæcal matter of an ochre colour ; the lower portion of the ileum





was injected and purple. Peyer's patches were all swollen and prominent; those in the upper part of the bowel, white and opaque, the inter-follicular ridges for the most part in contact and overlapping the follicles, as in the first stage of enteric fever, those in the lower portion of the ileum were beautifully injected, purple, and raised about the one eighth of an inch above the pale mucous membrane surrounding them. Just above the valve the injection was more vivid, and many of the solitary glands were swollen and ecchymosed. The large intestine was quite healthy.

CASE 16. Death on the tenth day of scarlatina; general and severe inflammation of the mesenteric and intestinal glands.—Jane Bradbrooke, æt. $1\frac{1}{2}$, died of exhaustion with a huge bubo on either side of the neck. The body was mottled with a dusky scarlet rash. The heart was free from clots. The liver pale, $18\frac{1}{2}$ ounces; the gall-bladder contained half an ounce of clear, watery fluid of the colour of pale urine; on a white plate it had a bright yellow tinge. Pettenkofer's test thrice applied and compared with similar testings of other bile, gave not the slightest colour reaction. 1000 grain measures yielded at 212° Fahr. 11.1 grains of brittle, bright, gamboge-yellow extract, destitute of fatty odour. The spleen weighed $3\frac{1}{2}$ ounces, and was turgid, firm, and of a dark liver colour. The whole of the mesenteric glands were greatly enlarged, being of the size of ordinary marbles, round, turgid, and purple. The intestines contained slimy mucus and one or two sulphur-coloured pellets of fecal matter. In the ileum there was general and severe proenteritis, the glandulæ in the lower part being mostly white, and some of them twice and thrice the size of hemp-seeds. All the agminated glands were red, swollen, and elevated above the surrounding pale mucous membrane. This condition was as marked in the higher as in the lower parts of the ileum. A patch at the distance of four feet from the valve was abraded. The mucous membrane of the larger intestine was injected, and pink, and the solitary glands enlarged and congested.

CASE 17. *Death on the eleventh day of scarlatina; general inflammation of the mesentery and intestinal glands.*—John R—, æt. 13, died of exhaustion. The body was somewhat emaciated; the cervical glands swollen; the abdomen tympanitic. The gall-bladder was distended with clear watery fluid of the appearance of deep golden sherry by transmitted light, of an orange-yellow colour by reflected light; reaction decidedly alkaline; Pettenkofer's test gave only a faint, dull, purple colour; sp. gr. 1014; 1000 grain measures yielded 34·8 grains of brittle, deep-orange coloured extract. The spleen and mesenteric glands were swollen. The bowel contained some light ochre-coloured faecal matter. The Peyerian glands at and just above the valve were swollen, wrinkled, and pale; the rest were injected and slightly swollen, the mucous membrane being generally pale; the solitary glands were equally swollen. There was a bloody ooze upon the mucous membrane of the middle of the ileum for the space of nine inches. The solitary glandulæ of the colon were red and moderately swollen.

CASE 18. *Death on the twelfth day of scarlatina; general inflammation of the mesenteric and ileal glands.*—Jane A—, æt. 3, died from failure of the heart's action. The rash was livid on the eleventh day, and the glands on both sides of the neck were considerably swollen. The right heart and its large vessels contained colourless clots as in the other cases. The spleen was turgid. The mesentery was purple and greatly thickened from swelling and congestion of its contained glands. In the ileum there was general and severe psorentery and every Peyerian gland was dark-red and swollen; many being raised one eighth of an inch above the pale mucous membrane surrounding them. The large intestine was healthy.

CASE 19. *Death on the thirteenth day of scarlatina; acute desquamation of the mucous membrane of the large intestine, with bloody exudation and general inflammation of the mesenteric and intestinal glands.*—Mary G—, æt. 4, died of sloughing of the left tonsil and ulcerative destruction of

the left pillars of the fauces, severe glandular inflammation on both sides of the neck, and hæmorrhage from the bowels from the eleventh to the thirteenth day. The body was well nourished; the sides of the neck occupied by large buboes. The mesenteric glands were greatly swollen; the spleen turgid; the agminated and solitary gland of the lower third of the ileum were injected and raised above the level of the surrounding mucous membrane. The large intestine contained a brownish-red, grumous fluid, and, excepting the first six inches of the ascending colon, the whole bowel from the orifice of the vermiform appendix to the rectum was greatly thickened by the formation of a bright-red villous exudation. Scarcely any portion of the mucous membrane presented a natural aspect. Lining the cæcum as far as the valve, the bloody membrane thinned away and left the next six inches of the mucous membrane of the colon bare; it then commenced again as a more wrinkled thickening of the injected mucous membrane, and increasing in development upwards attained its greatest thickness (the quarter of an inch) in the transverse and descending portions of the colon, thinning away again towards the rectum which was also lined with it. The membrane was readily detached by the edge of a knife, and the exposed surface of the bowel was then seen to be blotched and spotted with ecchymosis. The spots were circular and very numerous; some were mere points, but many were one quarter of an inch wide; all were raised and had a central depression. They were, in fact, the swollen and bleeding solitary glandulæ, and it was thus evident that these were the foci of the severe inflammatory action which had resulted in the above described exudation. This formed a thick compact membrane, for the most part blood-stained, and so wrinkled by the contractions of the bowel that its processes strongly resembled a cockscomb. It was composed of much molecular matter (coagulated fibrin), blood-corpuscles, a great quantity of well-formed columnar epithelium, numerous dark granular corpuscles varying in size from a blood-corpuscle to the $\frac{1}{8}$ of an inch, and a few cells of squamous epithelium. In a word, the con-

stituents were those of acute desquamative colitis with exuded blood, a pathological condition completely agreeing with that which so frequently affects the kidneys in this disease.

CASE 20. *Death on the fifteenth day of scarlatina; moderate inflammation of the mesenteric and ileal glands.*—Isabella L—, æt. 12, died of diffuse suppuration of the glands and connective tissue of the neck, and purulent arthritis of the wrist, ankle, and shoulder, which came on the day before death. The mesentery was injected and the glands swollen. There was general but moderate psorentery, and Peyer's patches were injected and raised about one tenth of an inch above the paler mucous membrane. The large intestine was healthy.

CASE 21.—The brother of Charlotte B— (Case 25), a child æt. 4, was taken ill of a severe attack of scarlatina three days before his sister was affected and died on the fifteenth day. He, too, had complications of the lung, bowel and kidneys, and there was active pulmonary congestion, albuminuria, and towards the close, diarrhoea. The kidneys together weighed $12\frac{1}{2}$ ounces. There was also no affection of the solitary glands, but swelling and injection of the mesenteric and Peyerian glands.

CASE 22. *Scarlatina; death on the seventeenth day; purulent infiltration of the areolar tissue of the neck; inflammation of the mesenteric glands.*—Sarah W—, æt. 4, was admitted with a very severe attack. The rash was patchy and dusky, a sero-purulent fluid flowed from the nose and eye; there were large glandular swellings on both sides of the neck. The tongue was dry and the pulse small. She died of failure of the heart's action. The right side of the neck was raised to the level of the ramus of the jaw by a thick brawny swelling, and the deeper portion of the connective tissue was infiltrated with pus; the glands being in the same condition as in Case 23. The mesenteric glands

were as large as marbles, turgid and purple. The spleen weighed 4 ounces, it was firm and of a dark colour. The intestines were pale, and the solitary and agminated glands also pale and only very slightly raised. There was a mass of stone-coloured, soft, unhealthy fæces in the descending colon. The liver weighed 21 ounces; the gall-bladder was distended with clear, pale orange-coloured, ropy bile. The kidneys were pale, and weighed $7\frac{1}{2}$ ounces. The lungs were adherent, but free from traces of recent inflammation. The heart and great vessels were obstructed by colourless clots.

CASE 23. *Scarlatina; death on the twentieth day; purulent arthritis and nephritis; general inflammation of the mesenteric and intestinal glands.*—Helen G—, æt. 6, admitted on the third day of a severe attack of scarlatina, with a vivid rash. Pulse 120; dry tongue, and glandular swellings on each side of the neck. On the fifteenth day there was slight albuminuria and swelling with great tenderness of the left ankle and knee and the right elbow, together with purulent infiltration of the connective tissue of the neck. Henceforward she gradually sank. The glands of the neck were as large as walnuts, some pale others purple, some with softened centres and all imbedded in a purulent connective tissue. The joints above mentioned were full of yellow pus, and the glands of the popliteal space were purple and turgid, and surrounded by purulent tissue as in the neck. The tonsils and solitary glands of the tongue were purple and greatly swollen. The mesentery was greatly enlarged, as in Case 6, and many of the glands were as large as pigeons' eggs and purple, standing out on each side of the mesentery. In the ileum there was general psorentery and the agminated glands were all prominent, and swollen as in the early stage of enteric fever. Many of them were deeply injected at the centre; the mucous membrane of the ileum was pale. The solitary glands of the large intestine were so swollen and prominent as to be readily felt on passing the finger over the surface of the bowel. The spleen weighed $5\frac{1}{2}$ ounces; it was turgid and friable. The liver $35\frac{1}{2}$ ounces.

The gall-bladder was full, containing about 3 drachms of clear watery bile of the colour of dark sherry. As it flowed along a white porcelain plate, it left a deep gamboge track. Pettenkofer's test produced a good purple tinge, but the mixture had very little depth of colour. All the cavities of the heart contained white gelatinous breaking-down clots which extended far into the great vessels, and fluid chocolate-coloured blood. There was no trace of inflammatory action in the lungs. The kidneys weighed together 10 ounces, they were highly congested and the cortex was studded with bright blood points.

CASE 24. Death on the twenty-fourth day of scarlatina; inflammatory swelling of a portion of the mesenteric and ileal glands.—Mary V—, æt. 5, died exhausted with glandular swelling and diffuse cellulitis of the neck, and profuse foetid discharges from the nostrils and an ear. The kidneys were quite healthy, weighing together $5\frac{1}{2}$ ounces. The liver was enlarged and fatty, weighing 27 ounces. The gall-bladder full of green ropy bile. The spleen weighed $4\frac{1}{2}$ ounces, and was naturally firm. The mesenteric glands about the lower end of the ileum were swollen and purple. The intestines contained some pellets of natural fæces. The agminated glands of the ileum were all prominent. One of the largest of them, about a foot from the valve, was uniformly injected; others above and below partially so, and contrasted strongly with the paleness of the surrounding mucous membrane. There was no ulceration of the swollen glands, but the inter-follicular ridges were vividly injected, and the turgid vessels appeared bare. The valve itself was pale but as usual thickened by the swollen glands. The large intestine was healthy throughout.

CASE 25. Scarlatina; death on the twenty-ninth day; diarrhœa from the eleventh to the twenty-ninth day; limited pleuro-pneumonia on the seventeenth day; albuminuria on the twenty-third day; ascites and slight œdema of some parts of the areolar tissue on the twenty-seventh day; general inflam-

mation of the mesenteric and Peyerian glands.—Charlotte B—, æt. 5, was admitted on the second day of a severe attack of scarlatina. The rash was vivid on the fourth day, and there was glandular swelling of both sides of the neck. Pulse 120. On the eleventh day the rash had nearly disappeared, the glandular swellings were larger, pulse 124, and the bowels became loose, having previously acted rather freely. On the fourteenth day the bowels were very loose, and the abdomen distended; the angles of the mouth excoriated. The diarrhœa continued profuse, and the stools were light ochre coloured and flocculent. On the seventeenth day there was a short dry cough, the respirations were 50, the pulse 124; considerable elevation of temperature, and fine crepitation at the back of the left lung. She continued to have two or three loose stools a day; the pneumonic symptoms increased in intensity, the respirations being 64 and the pulse 130 to 140 on the twenty-seventh day, when the face became a little puffy, and the albumen of the urine increased. Death was preceded by a fluttering pulse and great orthopnœa. The diarrhœa continued unchecked. The body was well nourished, the face, ankle, and labiæ slightly œdematous, the skin desquamating, and slight glandular enlargement of the neck. There was half a pint of clear serum in the pleural cavities and about a pint in the abdominal cavity. The kidneys were pale and enlarged, weighing together $11\frac{1}{2}$ ounces, the cortical portion severely congested. The heart contained the usual firm entangled clots, branching for a considerable distance into the great vessels. The upper lobe of the left lung was covered with a layer of recent lymph, and it was in a state of simple pneumonic hepatization. The liver was severely congested and weighed $37\frac{1}{2}$ ounces; the bile was pale and watery; the spleen three ounces, firm; the mesenteric glands greatly enlarged, turgid and spherical; those about the junction of the intestines as large as a pigeon's egg. The whole mesentery formed a heavy lobulated mass. The intestines contained a small quantity of bright orange-coloured flocculent fæcal matter. The small intestine was pink from vascular injection, and the mucous membrane was covered with a thick adherent

layer of opaque white mucus. Some parts of the mucous membrane were vividly injected. Peyer's patches alone were much swollen, and for the most part pale. Some of the inter-follicular ridges were one eighth of an inch wide. One of the smaller glands appeared as if cicatrized at the centre.

CASE 26. *Death on the thirty-third day from the accession of scarlatina; swelling of the spleen and mesenteric glands, &c.*—Fanny L—, æt. 19, died of rheumatic fever and pericarditis, which supervened during convalescence from scarlatina. There was extreme orthopnoea during the two days preceding death. The pericardium was completely adherent. The heart greatly enlarged, weighing 16 ounces alone. There were large fibrinous clots in both ventricles, and a firm black clot in the right auricle. Kidneys slightly enlarged and fatty. The spleen weighed 10 ounces. The mesenteric glands were about twice their natural size and rather flabby. The intestinal glandulæ healthy.

CASE 27. *Death on the forty-first day from the accession of scarlatina; persistent enlargement of the spleen and mesenteric glands; disease of the kidneys.*—Harriet P—, æt. 17, died of exhaustion with albuminuria after a very severe attack of scarlet fever, during which, from the tenth to the fifteenth day, there had been diarrhoea. The liver was pale and fatty; the bile normal. The kidneys enlarged and pale, the right weighed $7\frac{1}{2}$ ounces, the left 7 ounces. The spleen weighed 10 ounces. The mesenteric glands were considerably enlarged, rose-coloured above, purple near the cæcum. The lower end of the ileum was injected and purple; a spot of ecchymosis in the mucous membrane existed just above the valve. The intestinal glands were healthy. The mucous membrane of the cæcum was injected.

CASE 28. *Death on the sixty-ninth day from the accession of scarlatina; slight tumidity of the mesenteric glands and Peyer's patches, congestion of the cæcum, disease of the kidneys.*—Harriet B—, æt. 19, died of pulmonary embolism and

albuminuria. The right cavities of the heart and the pulmonary artery and its branches were obstructed by a firm white clot; there was limited pericarditis. Liver fatty, 54 ounces; gall-bladder contained an ounce of healthy bile. Kidneys large, severely congested and the tubes stuffed with epithelial debris; the right weighed 10 ounces, the left 8½. Spleen 6½ ounces, normal in appearance. There was slight tumidity of the mesenteric glands and of Peyer's patches in the neighbourhood of the ileo-cæcal valve. The cæcum was severely congested, and there was extravasation of blood into the submucous tissue.

Upon analysis of the foregoing twenty-eight cases, it appears that the greater number died on days ranging consecutively from the third to the fifteenth day, and that the remainder died on the seventeenth, twentieth, twenty-ninth, thirty-third, forty-first and sixty-ninth days. More or less albuminoid or fatty degeneration of the kidneys existed in six cases, and in these death occurred on the fifteenth, seventeenth, twentieth, twenty-ninth, forty-first, and sixty-ninth days respectively. In the rest these organs were healthy. The pathological changes common, with a few exceptions (depending upon the time of the disease), to all, are as follows:

1. *The formation of fibrinous clots in the heart and great vessels during a pyrexial state, at any period of the disease.*

—This is the commonest cause of death during the early stage of scarlatina, it is indicated during life by the reduction often sudden, of a full pulse of about 120, to a dribble of 150 or 160 almost imperceptible impulses. The failure of the heart's action is commonly attended with orthopnoea and delirium from obstruction to the pulmonary and cerebral circulations. On opening the body before it has lost a degree of temperature, and while the hot blood is still fluid, the right heart will be found distended, partly with dark fluid blood which coagulates on exposure; and partly, sometimes chiefly by a large, firm, white, bifid clot continuous through the auriculo-ventricular openings. Each portion is interlaced with, and firmly adherent to the tendinous cords and out-

standing muscular bands of the cavity in which it lies, and sends outwards a rope-like continuation, the one into the pulmonary artery, and the other into the superior cava. These processes not only occupy a large portion of the area of these tubes, but branch with their branches upwards, into the cranial cavity and outwards into the lungs, whence they may often be withdrawn in ramifications up to the eighth degree, and eight or nine inches long.

The left heart was generally empty and firmly contracted ; in one case (1) each cavity was occupied by a large fibrinous clot, that in the ventricle spreading into the brachio-cephalic vessels of the arch of the aorta, and that in the auricle sending large ramifying branches into the pulmonary veins. In another case (12) the auricle was distended with dark softly clotted blood.

In Case 26 there were fibrinous clots on both sides of the heart, but there was pericarditis in this case.

2. *Marked derangement of the hepatic function.*—The bile was examined in twenty cases. In five only were the characters of the secretion normal, and in these cases death occurred on the third, fourth, twenty-fourth, and sixty-ninth days respectively—periods probably too early in the two former cases for the development, and in the two latter too late for the persistence, of any notable derangement of the bile.

In the remaining fifteen cases the bile was in a very deteriorated condition. In two patients (Cases 10 and 15) there were evidences of decided inflammation of the gall-bladder, the viscus being injected and the mucous membrane rose-coloured ; and in one of these cases (10) there was a complete absence of bile, the mucous membrane being merely moistened with a few drops of a colourless alkaline fluid. In three other cases the bile had a natural greenish-brown colour, but it was greatly deficient, like that of the remaining ten cases, in solid matters, the specific gravity in not one of the thirteen cases exceeding 1014, and the amount of solid matter not more than 36·4 grains, in 1000 grain measures of the secretion, being less than one third of the normal amount. In one case (16) 1000 grain measures yielded only 11·1 grains

of solid matter. In the majority of the cases the bile was turbid from epithelial débris, but on settling it became clear and transparent, and resembled pale urine. In all the thirteen cases there was a notable deficiency in the biliary acids; in one case (16) this was complete, and in three others (6, 9, and 17) nearly complete, Pettenkofer's test indicating, upon several trials, a mere trace. The colouring matter was never absent, and the thin bile always left a more or less bright-gamboge-coloured track after flowing over a white surface. The intestinal contents agreed with this condition of the bile. If, as rarely happened, the bowel contained solid fæces, they were in some cases of a pale ochre or sulphur colour. The fæcal matters, however, were generally fluid, grumous, or flocculent, often stringy, and of a pale ochre colour. Such also were the characters of the stools before death in many of the cases.

3. *General inflammation of the lymphatic system of glands.* This, as far as the ordinary lymphatic glands are concerned, was usually confined to those of the head and neck; but in two cases (20 and 22) those of the extremities were affected, in connection with suppurative arthritis. The cervical glands were swollen in every case, in some slightly, in several severely; and in the two cases just quoted, to the formation of huge suppurating buboes. The suppurative action, however, affected the connective tissue more than the glands, which were for the most part purple and enlarged to the size of marbles or walnuts, only a few of them, in the worst cases, having softened and purulent centres.

The tonsils and solitary glands of the tongue were generally affected in every case.

The spleen.—Was not noted in one case. In four cases (death at the fourth, fifth, twenty-ninth, and sixty-ninth day) the gland was not enlarged. In the remaining twenty-three cases it was swollen; and in five of these (ninth, twelfth, fourteenth, twenty-fifth, and twenty-sixth) it weighed from ten to twelve ounces. In young children the texture was firm, in adults it was sometimes of normal consistence and sometimes soft.

The mesenteric glands were generally and severely inflamed

in every case, the whole mesentery being thickened, and the glands purple and swollen, in some cases to the size of a pigeon's egg. Even the small glands in the attached borders of the transverse and descending mesocola were often found turgid and purple.

The solitary glands of the ileum were in the condition known as "psorentery," i. e. forming white granular or papular, solid-feeling elevations, giving to the mucous membrane the appearance of being thickly sprinkled with grains of sago in fourteen cases. In others the solitary glands were only partially affected, the swelling being usually softer and more diffuse in these cases, and the glandulæ deeply injected, some occasionally had an abraded appearance. In three cases, in which death occurred on the eleventh, seventeenth, and sixty-ninth days, there was only very slight swelling of a few of the glandulæ; and in the four remaining cases in which death happened on the fifteenth, twenty-fourth, twenty-ninth and thirty-third days respectively, these glands were altogether unaffected.

The solitary glands of the large intestine were enlarged and inflamed in Cases 4, 6, 7, 9, 16, 17, 19, and 23. In one of these (19) there was acute desquamation of the mucous membrane of nearly the whole of the large intestine. In another case (28) the cæcum was severely congested. In those of the remaining cases (about one half) in which the large intestine was examined, the mucous membrane and its contained glandulæ were quite healthy.

The agminated glands were more or less swollen and inflamed in every case but one (26), that in which death occurred on the thirty-third day. In Case 22 (death on the seventeenth day, from suppuration of the cellular tissue and glands of the neck) there was only slight swelling. In the other cases the inflammation was decided and in many severe.

The glands were commonly raised one-eighth of an inch above the surrounding mucous membrane, than which they were always more deeply injected, and in the greater number of cases the difference was very striking, the mucous membrane

generally being pale, and the swollen glands of a vivid red or claret colour.

The inflammatory action was usually confined to the glands in the lower third of the ileum, but in four or five cases the whole of the patches from the jejunum downwards were affected. The inter-follicular ridges were often one-eighth of an inch wide, giving to the paler glands a spongy appearance; but the ridges were more often vascular, and fine hairlike turgid vessels were occasionally very conspicuous. In some cases the vascular ridges were prolonged into folds a quarter of an inch in length (see Cases 3, 6, 7, and 12, in which death took place on the fourth and sixth days). In some of the larger glands isolated foci of inflammatory action were occasionally seen and sometimes the whole gland was in an almost bleeding state and appeared softened and abraded.

The general mucous surface of the ileum was severely inflamed in a few of the cases (1, 7, 8, 9, &c.). In some others it was covered over by a thick adhesive layer of opaque white or slimy mucus, the membrane itself being severely injected (see Cases 7 and 25).

If we now take the pathological conditions into one general view it will appear that *febris lymphatica is the appropriate scientific definition of scarlatina*; that death is very likely to occur during the first week of the disease from the formation of fibrinous clots in the heart and great vessels; that the condition of the biliary function is such as to lead to an outbreak of diarrhoea; that mesenteritis, and enteritis sometimes general but usually confined to the solitary and agminated glands, exist from the third day and onwards during an attack of scarlet fever, both being at their acme during the height of the fever, *i. e.* from the third to the seventh day; that the enteritis is usually latent, but ready to declare its presence upon slight provocation; and that this inflammatory condition of the mesenteric and intestinal glands may persist to the sixty-ninth day (see Case 28).

From this view *one general conclusion as to the connection of scarlet fever and enteric fever is inevitable, viz., that the pathological changes accompanying an attack of scarlatina*

include all those of the first stage of enteric fever, and are so far identical with them. And it follows therefore that the transition from the former disease to the latter is nothing more than a natural pathological sequence, readily determined by any cause which may increase the intestinal irritation.

Having arrived at this point of the inquiry, I now proceed to show that this transition is, under circumstances even favorable for its prevention, no uncommon event; that it is often very insidious in its progress, and complete in its results.

CASE 29. Scarlatina; convalescence on the thirteenth day; relapse during sojourn in the hospital with scarlet rash on the twenty-eighth day; fully developed enteric fever on the thirty-second day; convalescence on the fiftieth day.—George W—, æt. 30, was sent into the London Fever Hospital by a distinguished authority on scarlet and enteric fevers as a case of scarlatina, on the 23rd of July, 1869.

This was the second day of the disease. The rash was well developed and the throat was sore and congested; the pulse was 120. The tongue moist, and its papillæ prominent. The bowels had not been open for two days. He was ordered a dose of house mixture, and chlorine draught.

On the fourth day the rash was still present, the pulse 72. Tongue moist and furred. There was some desire for food, and fish diet was ordered.

On the sixth day the bowels were confined, and two compound rhubarb pills were prescribed.

On the twelfth day the pulse was 60, tongue moist and cleaner, the rash faded and the skin cool and rough, the throat nearly well; the bowels acting naturally.

Next day he was ordered full diet. He continued well, with rather a defective appetite, but regular action of the bowels, up to the twenty-eighth day, when, without any apparent cause, he suffered a severe relapse of pyrexia, pulse 132, with headache, anorexia, vomiting, the eruption of a general scarlet rash, and sore throat with redness and swell-

ing of the fauces. In the evening the pulse was 122, the temperature 103·8°.

Next day 104, temperature 103°; the thirtieth 106 and 105°.

On the thirty-first day 100 and 103·8°; the above-mentioned symptoms continued, the vomiting had not been completely checked, and to-day purging set in, the stools being very frequent, watery and greenish.

On the thirty-second day there were three loose stools, two rose papules on the abdomen, and tenderness and gurgling in the right iliac fossa.

On the thirty-third day there were three watery light coloured stools, and twenty fresh bright rose papules on the abdomen. The vomiting had ceased and the pyrexia had slightly declined.

On the thirty-fourth day, pulse 100, temperature 100·6°, four loose stools, numerous fresh spots, vomited thrice.

On the thirty-fifth day fresh spots continued to appear, and the rash was very bright, diarrhœa moderate, vomiting ceased.

On the thirty-seventh day there was decided improvement; the bowels continued to act three or four times in twenty-four hours, and the stools were characteristic of enteric fever; the abdomen and chest were freely spotted with old and new papules. During the next week the diarrhœa partially declined, convalescence began on the forty-fifth day, and the patient left the hospital well on the sixtieth day. During the latter part of the time he was under Dr. Murchison's care.

CASE 30. Scarlatina; convalescence on the nineteenth day; sojourn in the convalescent ward till the thirty-first day, when there was a relapse of pyrexia; on the next day diarrhœa, and during the following nine days fully developed enteric fever, with some peritonitis; convalescence on the sixty-fourth day.—Amy A—, æt. 14, was taken ill with rigors, sore throat, and pain in the back, and on the following day the scarlet rash appeared. She was admitted into the London

Fever Hospital on the fourth day, when the pulse was 120, the fauces and tonsils moderately swollen and congested, the conjunctivæ injected, and the body covered with a well-developed scarlet rash.

5th day.—Pulse 130, rash, dark and patchy. From this date the pyrexia declined. Desquamation began on the ninth day, and the bowels continued to act naturally. On the tenth day she took fish, and was ordered full diet on the nineteenth day. The appetite, however, continued defective, and for some days preceeding the thirty-first she did not eat the whole of her dinner. On the thirty-first day there was complete anorexia, and next day she complained of pain in the belly and had two relaxed yellow stools. In the afternoon the abdomen was full and tender, the pulse 130, and the tongue moist and covered with a white fur, and the skin rough, dry, and hot.

During the next nine days, she suffered from fully developed enteric fever, the abdomen being tympanitic, and extremely tender, the bowels acting three or four times a day, and the stools copious, liquid, containing yellow mucous flocculi, and of a pale ochre colour; the cheeks deeply flushed, the tongue dry, with a white hairy fur on the dorsum, and red tip and edges; the pulse ranging from 134 to 120, and the temperature between 105° and 100° Fahr. On the forty-second day she began to improve, and on the forty-fifth the pulse was 124, and of better power; the tongue moist and almost clean; the abdomen free from distension, and only slightly tender to the touch; a softer cooler skin, and one soft stool in the day. The improvement continued, and, excepting a recurrence of diarrhœa on the fifty-second day, she progressively though slowly convalesced. She left her bed on the sixty-fourth day, and was discharged well and hearty on the one hundred and tenth.

CASE 81. Scarlatina; convalescence on the thirteenth day; discharge from the hospital on the twenty-third day; super-vention of enteric symptoms on the thirty-seventh day; re-admission in a typhous condition, suffering from enteric fever on

the fifty-eighth day ; convalescence on the eighty-first day.—Rebecca K—, æt. 26, had a characteristic attack of scarlatina in the London Fever Hospital. On *the eighth day*, the rash had not entirely disappeared, and the throat was still red and slightly swollen. She resumed ordinary diet on the thirteenth day, and left the hospital apparently quite well on the twenty-third day. The bowels had acted naturally throughout. She was readmitted and again came under my care thirty-five days afterwards (*the fifty-eighth day*). On inquiry it was found that she had lost appetite shortly after leaving the hospital, and that for the three weeks previous to her readmission, that is, from about the thirty-seventh day, she had been in bed suffering from fever and diarrhoea, and had been gradually getting worse. Her condition was indeed critical; she was delirious, with a fluttering pulse of 144, a dry brown shriveled tongue, and there was sordes on the teeth. The pupils were dilated, the face pale, with a circumscribed dusky flush on either cheek, the abdomen full, tender, gurgling on pressure, and marked with numerous rose papules, and there were frequent pale ochre-coloured, flocculent stools. The thick cuticle of the soles of the feet was separating. Fresh spots continued to appear during the next three days, and the pulse continued very high. The diarrhoea, which had been excessive, was soon completely checked, otherwise she continued in the same critical state until the sixty-ninth day, when an eruption of sudamina over the chest and abdomen, the reappearance of moisture in the mouth, and a diminution of temperature indicated an improvement. The pulse was 120. Next day the sordes began to clear away, there was slight epistaxis, and the pulse was reduced to 112. The bowels were now constipated. On the seventy-eighth day the bowels acted naturally, and the motion was formed; pulse 104; tongue moist but furred; appetite returning. Henceforward she slowly convalesced, the bowels continuing sluggish. She had fish diet on the eighty-first day. She left her bed on the ninety-seventh, and was discharged well on the one hundred and twelfth day from

the accession of the scarlet fever, and the seventy-fifth from the commencement of the enteric.

CASE 31. *Severe attack of scarlatina ; convalescence on the twenty-seventh day ; slight relapse with a trace of albumen in the urine on the thirty-second day ; a second renewal of pyrexia on the forty-first day ; diarrhœa and pneumonia on the forty-third ; continuance of the symptoms ; hæmorrhage from the bowels on the forty-seventh and fifty-first day, when she died.*—Sophia N—, æt. 12, was admitted on the second day of a severe attack of scarlet fever. Pulse 140, great prostration, sordes, and a general scarlet rash. The rash persisted for six days and was followed by free desquamation. On the ninth day the glands at the right angle of the jaw began to swell, abscess formed, and pus was evacuated by three successive incisions, a free discharge continuing for twenty days. There was also slight swelling of the glands on the left side of the neck, and for some days ashy mucous ulcers of the tongue. During the first week the bowels were constipated, and one or two doses of house medicine were required ; during the fifteenth and sixteenth days there was diarrhœa. The fever continued high until the twenty-second day, the pulse ranging from 128 to 140. From this time she began to improve. On the twenty-fifth day she enjoyed fish diet, and was soon afterwards allowed full diet. Her appetite was moderate and the bowels were rather sluggish. On the thirty-second day the temperature rose 2°, and there was a trace of albumen in the urine. This disappeared by the forty-first day. On the evening of this day there was a renewal of the pyrexia with nausea and vomiting. On the forty-third day, pneumonia of the right lung was declared, and the bowels were very loose. The pneumonia increased, and the diarrhœa continued, accompanied by moderate hæmorrhage from the bowel on the forty-seventh and again on the fifty-first day, when she died, the event being chiefly determined by the pulmonary mischief. No post-mortem examination was made.



CASE 32. *Scarlatina; convalescence on the twentieth day; discharge on the thirty-first day; readmission with fully developed enteric fever on the fifty-sixth day; death, ulceration of Peyer's patches.*—Rebeca S—, æt. 22, was admitted into the London Fever Hospital during the decline of a moderate attack of scarlatina. On the twelfth day, the pulse was 112; the tongue red, and dryish at the centre; the fauces still red and swollen; the rash, which had been general and conspicuous, faded; and the skin desquamating. On the fourteenth day, pulse 96; tongue as before. On the sixteenth day, improvement continued; fish diet. Excepting that the appetite continued somewhat defective, she convalesced without interruption, and was discharged apparently well on the thirty-first day. The bowels had acted regularly throughout the attack. She was readmitted under the care of my colleague, Dr. Broadbent, on the fifty-sixth, suffering from enteric fever and having the characteristic rose rash. She stated that she took to her bed the day after she left the hospital (the thirty-second), feeling weak and having no appetite, and that she had not left it since. On the forty-eighth day, diarrhœa came on, and had continued ever since. On admission she had the characteristic symptoms of fully developed enteric fever, including distinct rose papules. The rash continued to appear until the sixtieth day, the diarrhœa of loose, light coloured stools persisted; the urine was albuminous, and she sank on the sixty-fourth day. The post-mortem examination revealed the characteristic lesions of scarlet and enteric fevers. The kidneys weighed each nine ounces, and were soft and congested. The spleen, thirteen ounces, was friable; and there was extensive ulceration of Peyer's patches, and the solitary glands. I am indebted to Dr. Broadbent for this account of the enteric attack and its result.

CASE 33. *Moderate attack of scarlatina; convalescence established, and resumption of solid food on the twelfth day; sojourn in the convalescent ward until the twenty-seventh day, when a relapse of pyrexia occurred; symptoms of enteric fever on the thirty-second day. Full development of the same on the*

thirty-ninth day ; pneumonia and persistence of the enteric symptoms on the forty-sixth day ; death on the fiftieth day ; ulceration of the solitary and agminated glands of the intestines.—Jane M—, æt. 11, was admitted into the London Fever Hospital on the second day of an attack of scarlet fever of ordinary severity. The rash was well developed and the fauces and tonsils were congested and swollen, the cervical glands slightly swollen, the pulse 100. The rash and sore throat persisted on the eighth day. On the twelfth she was convalescent. On the twenty-seventh day she was ordered to bed on low diet, on account of a slight relapse of pyrexia with anorexia. Up to the thirty-second day there were no particular symptoms, the bowels had continued to act naturally, and the tongue was commonly moist and coated, the pulse and temperature under 100. On this day, however, there was an increase of the pyrexia, and the child became flushed and stupid, the skin pungently hot, the pulse 108. From this time the bowels gradually became irregular and the stools loose. On the thirty-ninth day, there were four dark yellow watery stools, a full and tender abdomen, and two obscure rose spots, a dusky circumscribed flush on each cheek, a hot, dry, harsh and still desquamating skin, pulse 116, a clean red tongue inclined to become dry and to fissure in the centre. The mind was dull and the body rapidly emaciating. On the forty-first day she lay in the same state, the abdomen a little more tense, the tongue dry and wrinkled, the angles of the mouth and orifices of the nares excoriated and bleeding, diarrhœa moderate, and the stools characteristic of enteric fever.

On the forty-sixth day, the pulse rose to 120, and symptoms of pneumonia appeared. On the forty-eighth day, there was marked consolidation of the lower portion of the right lung, and the respirations were 34. The diarrhœa continued, and the patient died on the fiftieth day from the accession of the scarlatina.

The body was greatly emaciated, a large gland overlaid the right mastoid process, and there was a chain of enlarged glands on the left side of the neck. The left pleura were

healthy, but there was a patch of hardened fleshy lung, which sank in water, about two inches across in both the upper and lower lobe of the lung of this side. There was pleuropneumonia of the right side, and the lower lobe was in a state of red hepatization and sank in water. The right cavities of the heart, the cavæ and pulmonary artery, and their primary branches were obstructed by firm colourless clots; the liver pale and fatty, forty-nine ounces: the gall bladder full of watery grumous, pale orange-coloured bile, bright and clear on standing, feebly alkaline, sp. gr. 1012·5. Pettenkofer's test gave only a faint, dirty purplish-brown tinge; 1000 gr. measures yielded, at 212° Fahr., nineteen grains of brittle yellow extract; the kidneys were healthy, weighing together nine and a half ounces; the spleen, five ounces, was firm and flabby; the mesenteric glands enlarged, flabby, and of a chocolate-brown colour; the intestines were moderately distended with air, and contained soft pale ochre coloured masses of fæcal matter; the mucous membrane of the small intestines was moderately injected. The last two feet of the ileum was the seat of twenty rounded ulcers, varying from a quarter to three quarters of an inch across. The ulcers occupied the sites of the agminated glands, and the large Peyer's patch, which is placed about two inches above the valve, contained within its area four of these ulcers; they were generally pale and smooth, and the edges even and rounded. The edges of a few were thicker, very vascular and angry-looking. Some of the ulcers lay so near the peritoneal coat that their situation was marked externally by a vascular area. All were in process of healing, and three or four Peyer's patches presented a smooth, injected, rose-coloured cicatrix effacing a considerable portion of the glandular structure. The mucous membrane of the large intestine was considerably injected, and the solitary glandulæ of the transverse colon were swollen, and many of these ulcerated, the ulcers ranging in size from a slight abrasion of the central depression of the gland, to half an inch across the widest part. The edges of these ulcers were slightly raised; some were dark and vascular, others had an ashy appearance. The glandulæ

of the other portion of the large intestine were swollen, and of a darker colour than the mucous membrane surrounding them.

Having now traced the relation which subsists between scarlatina and enteric fever to its extreme results, I will, with the view of giving more completeness to my account, narrate a few instances in which symptoms of the two diseases coexisted. And, as an appropriate introduction to these examples, I will briefly indicate the points where the outward symptoms of the two diseases meet and overlap one another. In the early stages of scarlatina and enteric fever the bowels are usually confined; in the latter stage of scarlatina they are occasionally loose, and the stools have the same character as those of enteric fever. Rose papules are not to be observed in many cases of enteric fever; and they may, if carefully sought for, be occasionally found in scarlatina. But such papulæ as usually occur in enteric fever—I mean the few, often indistinct rose spots which mark the pallid skin, and which we may properly regard as diagnostic of the disease—such papulæ, I say, can hardly, or not at all, be discovered amongst the rough and vivid rash of scarlatina. It is only, therefore, when the rose papules are very distinct and well developed that we can expect to distinguish them positively in scarlatina; yet this may be done in no inconsiderable number of cases. But if the scarlet rash be fading, as is usually the case when the papulæ appear, then they are sufficiently distinct; and if we should see the patient for the first time at this stage of the disease, and particularly if the bowels happen to be loose, we should conclude that he was suffering from enteric fever, and such would surely be the correct diagnosis; but we must not, on that account, ignore the fact that a few days before, the disease was well marked scarlatina. A large number of cases of enteric fever may thus be traced back to their origin in scarlatina; and it is as incorrect as it is unscientific to divide the train of outward symptoms which constitute the phases of one morbid condition into two sets indicative respectively of two specifically distinct diseases—so regarded. All such classification puts an artificial line of demarcation where no

real limit exists, and, for a time at least, effectually bars the advance of truth.

Excepting perhaps the flushed cheek, the mark of persistent abdominal irritation, there is no feature of enteric fever, which may not be observed in many cases of scarlatina; and conversely, a large number of patients who come under our notice for the first time suffering from enteric fever, will present the pallid face, the excoriated nostrils, the large red lingual papillæ and tonsils, the moniliform glands, and, occasionally, the aural discharge of a declining attack of scarlatina.

Again, some albuminuria is a common associate of scarlatina, but it may occur at any period of an attack of enteric fever. The urine of one of my patients who died of frightful sloughing of Peyer's patches on the 20th day, was loaded with albumen for four successive days before her death; and at page 571, vol. 1, of 'Reynolds' System of Medicine,' I have given the history of another case in which albuminuria and general anasarca immediately followed an attack of enteric fever.

To proceed with examples of the concurrence or inter-currence of scarlet and enteric fevers:—

CASE 34. Mixed scarlet and enteric fevers; convalescence on the thirty-fifth day.—Betsy D—, æt. 24, was taken ill with rigors, headache, and sore throat. A well-developed scarlet rash appeared on the second day, when she was admitted into the hospital.

3rd day.—P. 120; skin hot, and covered with a moderate typical scarlet rash; tongue moist, with a yellow fur.

4th day.—P. 124; tongue dryish; still a general scarlet rash with a copious eruption of distinct rose papules over the chest and abdomen; bowels sluggish; ordered ʒss Olei Ricini cum mʒ Tr. Opii.

5th day.—Pyrexia increased; tongue dry; delirium; one costive stool.

6th day.—P. 120; tongue dry; quiet delirious; no action of the bowels. The oil and opium were repeated.

7th day.—The general scarlet and papular rose rashes persisted; the oil acted twice.

8th day.—P. 108; scarlet rash paler; the rose papules continued of a bright colour; two natural stools.

9th day.—P. 108; tongue parched; cheeks flushed.

10th day.—Delirium continued; bowels confined; slight bronchitis.

During the next five days the rash disappeared, the cough became troublesome, with frothy expectoration, the bowels acted regularly without medicine, the pulse ranged from 120 to 100, and there was a general improvement, the expression becoming more lively and the intellect clear.

From the fifteenth to the twenty-fifth day the bowels were occasionally loose, and solid food, for which she had a desire, provoked diarrhœa. A small slough formed on the nates, otherwise she progressed favorably.

On the thirtieth day she was able to take fish, and thenceforward she convalesced without any drawback.

CASE 35. Mixed scarlet and enteric fevers; convalescence on the twenty-eighth day.—Harriet B—, æt. 21, one of a family in which several children were ill of scarlatina. Her illness commenced with rigors, sore throat, and general scarlet rash.

She was admitted on the fourth day, when the pulse was 120, the skin moist and covered with a faint scarlet rash; the tonsils and fauces congested and swollen.

On the fifth day the skin was perspiring and the rash gone; the tongue moist with a silvery fur; the bowels as yet acting quite naturally.

On the evening of the sixth day she had three loose ochre-coloured stools, and there was slight delirium.

On the eighth day the diarrhœa had ceased; pulse 104; the tongue moist, with elevated papillæ.

On the eleventh day the bowels were again loose, and there was slight sordes on the teeth; pulse 100.

On the thirteenth day continuance of the diarrhœa; abdomen a little full and tympanitic; a single rose papule.

Pulse 108; tongue brown, parched; cheeks flushed; a little dry cough; in a word, the typical appearance and symptoms of enteric fever.

The diarrhoea decreased, and the condition of the patient improved, and on the twentieth day there was but one lax motion in the day; pulse 100; tongue moist, and rather red, with a scattered white fur.

She had fish on the twenty-third day, a chop on the twenty-eighth day, and thenceforward convalesced rapidly.

CASE 86. Mixed scarlet and enteric fevers; convalescence on the forty-fifth day.—Sophia A—, æt. 26, engaged as night nurse in one of the scarlet-fever wards of the London Fever Hospital.

After ailing for three days was taken with rigors, sore throat, and the eruption of a scarlet rash and general pains; pulse 132; tongue moist, and slightly coated.

During the next four days the throat continued slightly swollen and sore, the bowels remained constipated, and she had two doses of house medicine; the pulse ranged from 128 to 116.

On the ninth day the cheeks were deeply flushed, and the bowels became loose, and in the evening there were five distinct rose papules on the abdomen: pulse 120.

The diarrhoea and a copious eruption of rose papules continued until the twenty-first day, and she became reduced to a critical condition, the pulse ranging from 120 to 130.

On the twenty-second day the pulse was 132, and there were sordes on the teeth, and a dry brown tongue.

On the twenty-fifth day the stools were improved; the pulse was 120, and stronger.

From this time she gradually improved, and was convalescent on the forty-fifth day.

The intercurrent and sequence of scarlet and enteric fevers has been noted by several authors, and attributed to accidental coincidence. I believe that I have now adduced sufficient evidence to satisfy an unprejudiced mind that it is

due to a most intimate pathological relationship ; in a word, that the pathology of scarlatina is precisely that of the first stage of enteric fever. In my article on "Enteric Fever," in Reynold's 'System of Medicine,' I have already expressed my convictions on this matter, and so strong were they at the time that work was publishing that I find I have in the proof sheet applied the term "Abdominal Scarlatina" to the contagious variety of enteric fever. I abandoned the use of the term at that time because it seemed to me that the evidence which I had adduced to show the connection implied by it was insufficient to convince those whose opportunities for examining the question in detail are rare, and whose scholastic principles would be shocked by such confusion of two diseases so universally regarded as specifically distinct. Now, however, that I am enabled to lay before the Society the full and complete evidence contained in the foregoing observations I will submit this term "Abdominal Scarlatina" to the profession as the appropriate definition of a disease which every intelligent practitioner will sooner or later meet with. Nor will I allow the opportunity to slip me, but in the interests of truth, as opposed to dogmas worthy of the dark ages, will ask my fellow labourers to go one step further with me, and discarding those transcendental ideas of enteric fever which make of it a specific disease dependent on one particular poison, open their minds to receive what experience will then soon teach them—that enteric fever, and all its attendant phenomena, may occasionally become a part of almost any other general inflammatory condition, specific or simple.

In conclusion, I desire to record my obligations to Dr. William Henderson, the resident medical officer of the London Fever Hospital, in charge of my cases, for the ready and efficient help which he has given me in the wards and mortuary in following out my observations on the foregoing cases.

A CASE
OF
COMPLETE RECOVERY
AFTER
NECROSIS OF THE BODY OF A
CERVICAL VERTEBRA.

BY
WILLIAM OGLE, M.D. OXON., F.R.C.P.

Received November 2nd, 1871—Read January 9th, 1872.

THE following short history appears to me worthy of record, if for no other reason, yet as showing what serious lesions this body of ours may undergo, and yet not only perfectly recover, but recover without any notable degree of suffering or pain :

J. S—, æt. 40, ex-policeman and chequetaker at a music hall, came to me in the out-patients' room on October 8th, 1869. He was a strong-built man, of florid complexion and healthy aspect, and said that he had never known what it was to have a day's illness till some few months back, when he began to feel a "dry soreness" at the back of his throat, which had since gradually increased, until at the time of his visit he experienced considerable difficulty in deglutition.

On looking into his mouth, which he could not easily open, I found the back parts of the cavity so swollen that it was impossible to see behind the velum. His breath had the most unutterably filthy odour. Introducing my finger I felt a hard substance at the back of the pharynx, which could be nothing but exposed bone. The throat was by no means sensitive, so that the man could submit without difficulty to such examination. There was a certain amount of thickening about the back of the neck, but no pain nor tenderness, excepting in a very slight degree when pressure was applied behind the ears.

The man had had a sore on the glans penis fourteen years previously ; and six years back had suffered from sores on the skin, and spots on other parts of the body. But no other syphilitic antecedents could be detected.

Notwithstanding my efforts to persuade this man to come into hospital he positively refused to do so, and laughed at representations to him of the serious nature of his malady, asserting that, except the difficulty in swallowing, he felt quite well, and able to do his work. He, therefore, continued out-patient, being warned against sudden movements of the head, and recommended to wear a stiff-stock, and to take large doses of iodide of potassium with ammonia and sarsaparilla.

Four days later the man came again to see me, and wished to be discharged, saying that he had recovered perfectly. With him he brought a large piece of fœtid substance which had come from his throat in the following manner :—On returning home after his previous visit he had introduced his finger into his throat, and fidgeting the hard substance about had succeeded in at last loosening it a little. By a repetition of this the piece became at last so loose that he was able by a strong wrench to extract it altogether.

The substance when macerated was found to contain numerous small particles of bone, and one large piece, forming almost the entire body of a vertebra, which, as far as could be judged from the position of the hole, was the fourth cervical. The portion consisted of the whole length

of the vertebra, for at one end there was the impression of the cartilaginous disc, and at the other not only a piece of the disc itself but also a part of the next succeeding vertebra. In thickness the portion includes at least three quarters of the whole thickness of the body of the vertebra, and the exceedingly carious condition of the piece, especially on its dorsal aspect, can leave no doubt but that the entire body had come away.¹ The swelling at the back of the mouth and pharynx had now subsided, as also the difficulty in opening the mouth, and deglutition was again easy. I was thus able to get a view of the hole from which the piece had come, and found it full of a cheesy-yellow matter. There was no pain whatsoever, and it was with the greatest trouble that the man was persuaded to remain under observation even as out-patient.

During the next two months the man came frequently to see me, the stiffness and swelling in the neck, which had never been very great, gradually disappearing. The hole, however, in his throat still remained unhealed, and from time to time discharged purulent matter mixed with bits of bone "as large as rook-shot."

On December 3rd the man was attacked by pain in the shoulders, which had the good effect of frightening him so far, that I persuaded him at last to come into the hospital.

He was placed on his back on a sloping bed, his head being fixed by sandbags, and strict orders were given that for no purpose whatsoever should he stir from this horizontal position. His treatment, as before, consisted of large doses of iodide of potassium, with ammonia and sarsaparilla.

In this position he lay till June, that is, for six months, his general health remaining throughout good. The pains which had induced him to come in only lasted a few days and then disappeared altogether. While they remained they manifested distinct nocturnal exacerbations, which added to the strong probability that the cause of his condition was syphilitic. On one occasion during these six months (Jan. 8th, 1870) the man was nearly choked at night, but at last

¹ The piece of bone was exhibited to the Society. It is now in St. George's Hospital Museum.

expelled another largish piece of foetid substance, which, unfortunately, he neglected to keep for inspection. This left another hole in his throat, on the right of the older one, which had not yet healed, though becoming smaller. Such, at least, was the account given by himself, for I was unwilling to make any ocular examination of the throat, as this could have been of no practical utility, and would have been attended by much risk. The patient himself, however, introduced his finger and examined the condition of the holes with perfect indifference. He could put his finger into them "to hitch out a pill," as he said, or any particles of food which might lodge there, without the least pain or inconvenience.

On another occasion (Feb. 16th) he had, again, a fit of choking, and expelled two foetid pieces of substance, each about the size of an almond. These, when macerated, yielded several spicules of bone, and two thin coherent discs, which I take to be portions of fibro-cartilage, that had been exposed by the necrosis of the vertebral centrum. The rotten condition of these pieces after long maceration has destroyed all structure in them.¹

The only symptoms during all the time referable to the nervous system was an occasional slight numbness of the middle finger of the right hand.

When the man had thus passed six months, the holes in the throat were almost closed, and he became so fretful and impatient that it was impossible to keep him any longer in bed. After consulting, therefore, with Mr. Holmes, I had his head and shoulders confined in a stout leathern splint, which made the head almost immovable; and impressing on him as strongly as I could the great danger involved in any movement of it, sent him to the Convalescent Hospital at Wimbledon.

After a month spent there the holes were entirely healed, and the throat looked quite healthy, excepting that the soft palate had become in one place adherent to the back of the pharynx. There was a certain degree, not a considerable

¹ These were also exhibited. They are in St. George's Museum.

one, of thickening about the back of the neck, but no deformity of shape nor other sign whatsoever of what had occurred.

Soon after this the man quitted London altogether, and I have not since seen him. But fifteen months later (Nov. 1870) I received a letter from him, from which I quote the following account verbatim :

"I am pleased to inform you that I feel quite well in health, and that I never feel any pain in the head or the throat. I believe the wound in the throat is quite sound. I have had colds, but never felt the least soreness in the throat. My head is movable but not quite so free as before. I can move it best to the left. It is rather stiff to the right. I go to work on father's farm, mowing, reaping, loading, and all heavy work with our labourers. So if the neck was not sound I should soon find it out. I also go out horseback and shooting, jumping over hedges, and have been in one running match; blow my instrument, and nothing seems to hurt it. I have told you this to show you that I have gave it a fair trial. I never took a dose of medicine since I left the hospital."

I need not waste the time of the Society by enlarging on the various points of interest in the foregoing case. They are sufficiently obvious of themselves. Neither is it worth while to discuss the question whether the origin of the mischief was or was not syphilitic? Though the man's previous history, the absence of any other apparent cause, and the nocturnal exacerbations of pain at the time of admission into hospital, lead me strongly to suspect that such was in reality the starting point.

I will therefore merely recal to the memory of the Society, that in the 32nd volume of its 'Transactions' is an account by Mr. Wade of a case in which a syphilitic patient lost "the greater part of the anterior arch of the atlas, with the entire articulating surface from the odontoid process of the axis." The ulcer was not healed in Mr. Wade's patient at the time when the paper was read, and I do not know whether the man eventually recovered.

There is, however, in the museum of St. George's Hospital the material record of a similar case, in which perfect recovery ensued after the removal, by Mr. Keate, of the anterior portion of the atlas, including the facet for the odontoid process, and of a portion of the occipital bone from the border of the foramen magnum. This case is recorded in the 'Medical Gazette' for 1835 (vol. xvi), and the piece of the axis removed is pictured in a note by the editor to Mr. Wade's paper. The specimen itself I exhibit to the Society.

A cure is also recorded by Dr. Mackenzie in the 'Pathological Transactions' for 1869, in which recovery followed after what was believed to be a part of the transverse process of the second cervical vertebra had been expectorated.

Postscript, June, 1872.—Since this paper was read I have again seen the man. He appears in robust health. There is no visible sign whatsoever of the hole that existed at the back of the pharynx. On pressing the place with the finger, it seems that the hole is filled by some firm elastic substance, but not by hard bone. The man holds his head somewhat stiffly on his shoulders, but has a fair power of rotation. There is no deformity in the cervical region, and scarcely any sensible thickening.

ON THE
CEREBRAL MECHANISM OF SPEECH
AND THOUGHT.

BY

WILLIAM HENRY BROADBENT, M.D., F.R.C.P.,
PHYSICIAN TO, AND JOINT LECTURER ON MEDICINE AT, ST. MARY'S HOSPITAL,
AND PHYSICIAN TO THE LONDON FEVER HOSPITAL.

Received January 31st—Read February 13th, 1872.

THE question of the association of loss of speech with lesion of a particular convolution in the left hemisphere of the brain has not been formally discussed by the Royal Medical and Chirurgical Society ; the close functional relation between the left third frontal gyrus and speech has, however, been implied in papers read before the Society. This relation has been the starting-point of the investigations and speculations contained in the present communication, and may in a certain sense be said to form the basis of the main conclusions here stated, though many are essentially independent of it. The objects of the communication are by means of the light thrown upon cerebral physiology by cases of loss or derangement of speech to construct a theory of the mechanism of speech and thought, and to connect this with the facts of cerebral structure so far as at present ascertained. If the nervous system is the instrument of

language and of thought, then the objective aspect of the operations concerned in what are subjectively mental processes will be changes in cells and fibres, and we shall understand the physiology of intellectual operations only so far as we can represent them in terms of cells and fibres.

The following cases are first related partly as additional evidence of the association of a certain factor in the expression of thought by language, with the left third frontal gyrus, some of them as remarkable and interesting in themselves, and as affording a new insight into the mental processes of which language is a resultant.

CASE 1. Right hemiplegia, with loss of speech and writing; hemiplegia fugitive; loss of speech permanent, except as to a few words mostly used emotionally; evidence of remarkable degree of intelligence and energy. Lesion in two parts of upper edge of fissure of Sylvius in left hemisphere; viz., posterior end of third frontal convolution and lower margin of supra-marginal lobule, the latter extending to the adjacent convolutions of the island of Reil; atrophy of tail of corpus striatum.—Mrs. W. B—, æt. about 70, was under my observation from time to time from July, 1868, till her death in August, 1871. The patient was a widow lady, and at the time of the seizure she was away from home for her health, and had just returned at 8 p.m. on July 26th, 1867, from a walk with a friend.

The attack was immediate and attended with complete loss of consciousness. She was placed on a sofa, where she was found next day still unconscious, having, however, about 4 a.m. manifested consciousness by pointing to her night dress and to the sofa as if to inquire how it was she was there. In the evening she recognised her relatives, and by her movements expressed great joy; later in the evening she made them understand, by pointing to her own pocket, and putting her hand into her sister-in-law's and taking out her purse, that she missed her purse and had no money. She was hemiplegic on the right side and quite speechless, trying to talk and angry that she was not understood. By the middle of the

following week she was able to walk upstairs, and in another week to return home, a distance of 100 miles or more.

On her return she spent several months among her friends but she was very restless and dissatisfied. She had by this time quite recovered the use of her limbs and regained a few words. Her relatives treated her as if she were utterly incapable of looking after her own affairs, and especially of taking charge of her own money. This was a great grievance, and when her husband's relatives visited her she tried to make it known by showing her purse and repeating excitedly, "Oh, shameful! shameful!" She had an intense dislike to her attendant, and when she left the room would often point in the direction in which she had gone, shaking her head and exclaiming with great energy, "Oh! nasty! nasty!" following it up by a long story in which there was not a single word intelligible. At length she went to the neighbourhood in which her husband's relatives lived, a distance of sixty or eighty miles, without any house having been taken for her or any preparations made, and indeed without any warning.

A house was now taken and furnished for her, and she showed herself quite competent in making all arrangements about it, and when settled in it with a new housekeeper she seemed quite contented. Her principal topic of attempted conversation for several months was her niece and brother's bad behaviour to her. She laboured hard to make the friends among whom she now was understand her grievances. She would point out her relatives' names, or refer to their letters, or in some other way show to whom she referred, and then in great excitement would exclaim, "Oh, Shameful! shameful!" then she would turn over letters and newspapers, and when she had tried in vain for hours to convey what she wished, she would shed tears, and say "Oh, pity, pity!" At length her banker's pass-book was obtained from her niece, and she scarcely knew how to express her joy. "I tried, and I tried," she said over and over again. But there was still something she wished to explain, and one day, while trying very hard as usual, she made the figures 40 quite distinctly, and it was understood at last that it was

something about £40, but it was not till a friend came to see her, and this happened to be mentioned, that it was discovered she had put £40 into a bank before her attack, and believed her niece had the acknowledgment of it and some promissory notes with other papers. These she wished to be sent for, and eventually they were obtained. This was nearly a year after her removal, and all the time she had persevered in her attempts at an explanation. During the same time she had been making a new will, and week after week would have her sister-in-law to write out the different clauses. It often took a long time to do it to her satisfaction, but she never rested till every particular was exactly as she wished it; when the right guess was made she showed her satisfaction quite unmistakeably by her gestures, and by saying "Yes, yes, that's it."

These details are given because they convey an excellent idea of her mental power. Here it was clear that the patient formed a very definite mental picture of the words she wished to use as well as the meaning she wished to convey, and that she not only wished and willed vigorously, but propositionized very definitely. That she knew what word she wanted was shown by her resorting to letters, and sometimes to a dictionary; and in one of my visits, wishing to recommend a linseed-meal poultice, and failing to convey her meaning, she went for the housekeeping book, and found an old entry of linseed meal. She also pointed out to me newspaper paragraphs which interested her. She frequently read, but preferred being read to. Common expressions which she retained were "that's right," "pity, pity." When a nephew or niece called, would say "How d'ye do?" "that's right." "How's your mother?" repeating this question, or "How's your poor mother?" as an inquiry about the father, as she could not say this word. These phrases came out very rapidly and interjectionally. Sometimes under excitement she would acquire a new word, as once when several nieces sat down with her to tea, to her great delight, she exclaimed repeatedly "beautiful, beautiful." Inquiring about nieces she used the word "Anne." Wishing

to name any place whatever, she generally said "Burlington," where she lived as a child.

She was quite unable to write, or *even to sign her name*. She once wrote down the figures 40, as related, and sometimes wishing to divide money would make the proper number of marks to indicate the amount of a share.

At 8 a.m. on August 7th, 1871, she appeared as well as usual, and said she had had a good night. An hour later she was found to be paralysed on the left side, and absolutely speechless, and she so continued till her death on August 12th, quite sensible, and manifesting concern for her attendants, but refusing food. When fluids were put into the mouth, unless carried quite into the throat, they returned; probably her refusal of food was due to difficulty of swallowing.

I made the post-mortem examination fourteen hours after death, with the assistance of my friend Dr. T. Kilner Clarke, the head only being examined.

There was much fluid on the surface of the hemispheres, which were evidently shrunken from senile atrophy. There was a considerable amount of fluid also in the ventricles. The vessels were comparatively little diseased, presenting here and there hard opaque patches and dilatations, but mostly soft and of normal size and appearance.

In the right hemisphere no morbid condition was discovered to account for the final left hemiplegia.

In the left hemisphere the lower end of the first ascending parietal convolution (or ascending frontal gyrus of some authors), abutting on the fissure of Sylvius, and a very small part of the adjacent posterior end of the third or inferior frontal gyrus were gone, and in their place was a hollow space occupied by fibrous tissue. The cavity might hold a nut, and had obviously shrunken by the falling in of the parts forming its walls. Again, in the supra-marginal lobule over the posterior end of the fissure of Sylvius, was another hollow filled with connective tissue, and when the fissure itself was opened out it was found to contain, at this part, a superabundance of connective tissue, and the convolutions of the

posterior end of the island of Reil were completely atrophied (they are here small and superficial). The gap in the lower end of the anterior parietal convolution corresponded with the posterior of the two lateral gyri of the insula.

In the ventricle the anterior end of the corpus striatum was plump and firm; but just where it begins to narrow and to overlap the thalamus, it suddenly became soft, and it might be said that from this point backwards the entire tail of the intra-ventricular corpus striatum was atrophied. (The part destroyed would correspond to the posterior of the two hæmorrhages in the wall of the Sylvian fissure.)

CASE 2. — Fracture of right petrous bone, Dec. 8th. Incipient paralysis of right face, Jan. 5th. Incipient loss of speech and writing, 8th. Complete loss of speech and writing, with slight paralysis of right limbs, 14th. Decided right hemiplegia, 16th. Death, March 18th. Abscess in substance of left frontal lobe; Surface of third frontal convolution, and convolutions of island of Reil not affected. White fibres cut across deeply.—William D—, æt. 42, carpenter, was admitted into St. Mary's Hospital, under the care of Mr. Lane, December 23rd, 1869.

On December 8th, fifteen days before admission, after having had "drink," fell down an area, was stunned, and remained unconscious for three quarters of an hour; bled freely from the nose and right ear. Subsequently a large quantity of clear fluid ("pints") flowed from the right ear. Up to the date of his admission he complained simply of headache, giddiness, and great weakness. On admission he was sensible, spoke well, had no paralysis, but was giddy; had pain in the right side of the head, and was quite deaf in the right ear. He lay in bed dozing, and paying no attention to what was going on, only complaining of headache when asked about it, presenting no other symptoms till January 5th, 1870, when slight paralysis of the right face was observed.

On January 8th, a month after the accident, the paralysis in the right side of the face was more marked, and some

hesitation and difficulty in completing his sentences were noticed. He would give the first few words of his reply to a question, and then become confused and use wrong words. When something was given him to read the first word was correct, the rest of the sentence nonsense. He was surprised and amused at this, and also that he was unable to write his name when told to try.

At this time there was no paralysis of the right limbs, but the paralysis of the face was recognised as hemiplegic, *i. e.*, as due to lesion in the left corpus striatum, and not to damage of the portio dura, the orbicularis oculi not being affected.

14th.—Paralysis of right face still more marked; slight hesitation observed in taking hold of any object with the right hand. Speech almost completely lost, unable to say anything but "Yes" and "No."

16th.—Right arm and leg almost completely paralysed as well as face. He lay on his back, the head and eyes turned to left, but readily carried to the right. When told to put out the tongue he opened his mouth at once, and the tongue moved to and fro, but was usually some little time before it protruded itself; then, however, it came out well, and with little deviation. Pupil of left eye larger than that of right, and sluggish; urine and fæces passed in bed.

It could not be satisfactorily ascertained whether sensation was impaired or not; it was certainly not lost. No definite conclusion could be come to as to the sense of smell after repeated attempts to test it.

When asked questions requiring "Yes" or "No" for answer, replied by monosyllables, which could be distinguished as intended for "Yes" and "No" respectively. To questions requiring for answer a phrase, however simple, he could only reply by an inarticulate mutter, in which no words were distinguishable. He would smack his lips or tongue and try again, and eventually would smile at his failure. The more prolonged the examination the worse he became.

I concluded after careful examination that he not only

understood what was said to him, and knew what meaning he wished to convey in reply, but that he knew what words he wished to say, though unable to utter them. This is, of course, simply an inference.

In the course of the case some new features presented themselves. On the 19th and 20th January he vomited his food. On the 20th a slight twitching of the muscles of the right side of the face was noticed. This became very marked, especially in his attempts to speak, the angle of the mouth being drawn rapidly and vigorously to the right every few seconds: this movement ceased during sleep. At times he called out loudly in the night, whether voluntarily or unconsciously could not be ascertained.

During the second week of February it was noticed that when asked a question he would apparently try to recollect what he wished to say; his face would assume the expression with which we are familiar when an effort is being made to recall something to memory, and he would sometimes put his hand to his head. This was not as he did at first, when he would reply promptly but inarticulately.

On February 19th, when I asked him his address, he repeated two or three times "My address," "My address," and finally, on failing to give it, said "Oh, deary me."

On February 21st there was a degree of improvement beyond anything previously seen. He answered, when asked how he was, "Quite well," "Quite well, thank you." Was unable to give his name or address, but repeated after me "Day," "William," "William Day," and after the last said "that's it," i.e. his name. Asked what he had had to breakfast, answered, after a time, "Can't tell." Tea? "Yes," repeated after me "tea," and then said "I had some pea." We had a similar conversation about bread and butter, but he could not repeat these words. On my asking him if he liked beer, and would wish to have some, he cried a little, and then said twice, "That's a thing I so like."

24th.—Answered "pretty well," when asked how he was, and gave several short answers correctly and distinctly. Could not give name and address; asked if he had forgotten

them, said "Yes." Could not tell what he had had to breakfast. Could not name a pen, finger, or hat when the object was held before him; to the hand, said "a plain hand."

He remained in much the same condition, completely paralysed as to the right limbs, eating and drinking well, but passing his urine and fæces in bed, till about the end of February, when he began to vomit his food and grow weaker. He answered questions less readily; would reply "very bad" when asked as to his condition. He gradually sank, and died March 18th.

Post-mortem examination fourteen hours after death.—When arch of cranium removed, outer surface of dura mater seen to be red, injected, and granular; inner surface of bone red and rough over greater part of vault. Fracture through right petrous bone.

Pia mater and arachnoid pale and anæmic; dura mater adherent to other membranes over posterior end of second left frontal convolution. Left frontal lobe seen to bulge outwards, and second frontal gyrus flattened and expanded from within. First and third frontal convolutions not altered on surface; apparently normal. Fissure of Sylvius slightly glued up, but convolutions of island of Reil and all the parts within the fissure presented normal appearance. No great amount of fluid in the ventricles; when the frontal ends of the two hemispheres were drawn apart, strong adhesions were found to exist between them where they come into contact below the narrow end of the falx major, and the left bulged considerably, encroaching on the right.

Fluctuation evident in left frontal lobe, and an incision along the second frontal gyrus, where the wall of the cavity was thinnest, penetrated an abscess of considerable size, the parietes of which were tough and dense, the contents "laudable" pus, with broken-down cerebral matter. The abscess extended deeply into the axis of this end of the hemisphere, and invaded the white substance of the third frontal convolution along its entire length.

This is one of the cases which have sometimes been considered exceptional. It is interesting on this ground, and

also on account of the partial return of speech, which, taken in connection with the healthy state of the cortical substance while the white fibres were cut across, suggests the speculation that some other way round was being opened.

CASE 3. Right hemiplegia ; absolute loss of speech and of voice ; embolism of right carotid and of left middle cerebral ; softening of outer part of left corpus striatum, and of adjacent white substance of hemisphere.—Mary S—, æt. 27, a lady's maid, was admitted into St. Mary's Hospital June 7th, 1870. She had had an attack of acute rheumatism seven years before and had never been well since ; was known to suffer from heart disease. Her recent history was imperfectly obtained, but it was ascertained that she had been suffering from pains in the joints, and especially in the feet ; her breath was short, and she sighed frequently ; she had a short time before the attack spit up some blood. She gave up her situation and came to London in April ; had since then been able to crawl about, but not to leave the house.

On May 29th she lost her speech for a few minutes.

On May 30th lost the use of the right side, and speech suddenly without convulsion or loss of consciousness.

There was no important variation in her condition from the time of her admission to her death on June 22nd. The motor paralysis of the right limbs was complete, and was attended with slight rigidity, which seemed to increase. Straightening the flexed fingers and movement of the leg gave pain ; there was a little movement when the sole of the foot was tickled. The paralysis of the face was very evident, and had the usual characteristics of facial hemiplegia. The tongue was protruded very slowly, and not far enough to exhibit much deviation. A pinch on any part of the affected side was felt.

The right forehead was at times observed to be moist when the left was dry ; the right cheek was the more flushed ; there were larger sudamina on the right than on the left abdomen. Urine and fæces passed in bed. Systolic murmur heard over apex of heart, and from this to lower sternum.

Her expression was placid, a little wistful when she was questioned, but never anxious or suffering. She followed one about with her eyes equally well in all directions, and not unfrequently smiled. She did not speak a single word or utter a sound, though at times she tried, and her lips moved. She nodded for affirmation, and shook her head for no. Seemed to understand all that was said, and to be puzzled how to reply. Asked if she could read or write before her illness; signified "no" with a smile. Asked if father and mother alive. Tried to say something, but in vain. At times I had doubts whether she quite understood my questions.

Temperature 99° on June 7th, 104° on 17th, 107·8° on 22nd, day of death.

Post-mortem appearances.—Extensive deposit on mitral valves. Surface of cerebral hemispheres much injected, especially the left, on which there were apparently minute extravasations. No superficial softening. A plug in *right* carotid, just as it emerged from the cavernous sinus, obliterating the vessel for a short distance, firm, yellow, and apparently of old date. The canal of the vessel beyond it was open and in communication with the posterior communicating artery, which was enlarged. There was a plug also in the left middle cerebral artery just within the fissure of Sylvius, completely blocking up the vessel.

On examining the corpus striatum of this left side in the ventricle a well-defined yellow patch with a sinuous boundary was seen along the outer side for about one half or two thirds of its length, but not extending round the anterior end, and involving about one third of the breadth. Continuous with this was a softened portion of the white substance of the hemisphere lying above and to the outer side of the corpus striatum, and about the size of a cob-nut.

CASE 4. Congenital aphasia.—William T—, æt. 11, was brought to St. Mary's Hospital for alopecia areata, February 17th, 1870. He was a bright, intelligent-looking boy, but had never talked. I kept him under observation for more

than twelve months, and condense and arrange the following information from my notes made at different times :

He is the fifth of nine children, five of whom are now alive and well ; two, the eighth and ninth, were born dead, one died of convulsions, another of scarlatina. The father died of phthisis ; mother living, and well. He was delicate as a child, but never had convulsions or any serious illness ; was run over at the age of six years and hurt on the left side of the head and in left leg ; he had not talked before the accident.

Face intelligent, eyes bright, and remind one of an intelligent dog from the keen way in which he watches one's face and movements. Nose broad and rather misshapen ; central incisors well formed and not notched, lateral rather pegged. Head of good size and shape, but when looked at from above, left frontal region seems to be smaller than right.

Facts as to general intelligence.—He plays with other children ; is irritable and passionate with younger children, trembles when excited, but is obedient and manageable. He can find his way about the streets, even to places he does not know, if the name is written for him. Can be sent errands with a note, will know what he is sent for, and refuse anything else ; will see that he has the proper change if told beforehand how much it should be.

Facts as to speech and writing.—He clearly understands everything that is said to him, but cannot utter a single connected sentence, and has never talked. To most questions he answers by a sound which may be represented by "keegur-kruger," whether the required answer be long or short. He says "no" distinctly, "yes" indistinctly, that is, without the y or s ; helping out the meaning by an affirmative nod. He always gave these replies appropriately. Says "father" and "mother," substituting v for th, and dropping the final r. These, with "dunno" for don't know, were all the words which could be got from him at his first visit. Asked name, address, how long the state of the head had existed, &c. &c. he answered "keeger-kruger."

He wrote his name pretty well, and copied several words from a printed card in written characters, but could not write yes or no when told to do so; could not write the name of the street in which he lived. Did not understand on this or any occasion the simplest *written* request, such as "Pick up the pen," "Put out your tongue." When word "pen" was written, and he asked what it meant, he named the letters, but had no idea what was signified.

His mother took great pains to teach him to speak. At one time he could, when asked his name and address, utter sounds evidently intended and capable of being identified as William T—, Circus Street; at subsequent visits he gave only "keegur-kruger." Another time, after having been frequently and urgently asked father and mother's name during one visit, at the next, when asked, said, "Faver dead—I got no faver." On this occasion also asked how he was, replied pretty distinctly, "All right, thank you." These phrases were subsequently entirely lost.

At different times he wrote for the word "no" "baleve" and "acbe;" for it, "is;" for card, "ke;" for "I am well," "waern;" for "I am better," began to copy the date 24th November which caught his eye.

A curious inconsistency was shown with regard to numbers. When asked his age he would write in large 12 on the palm of one hand with the finger of the other, and he wrote it correctly with the pen. When his mother removed from 25 to 41 he showed the new number by making a large 4 and 1 with his finger on the table. I wrote 41, and he said "yes." A subsequent change to No. 10 he indicated in the same way. Asked one day what time he left home, said "one o'clock" pretty distinctly. Another day asked the time by my watch at 2° 45', said "free o'clock;" afterwards, when told he was not quite right, "About half past two;" the words indistinct, but the intended meaning clear.

He could protrude the tongue and move it freely in all directions. He could produce after me all the vowel sounds, and with a little trouble, could say ba, be, bi, &c., through the alphabet.

The case may, I think, be fairly called one of aphasia. The difficulty was obviously not articulatory merely; on the other hand, the boy was not an idiot in any sense, and was not speechless through a general deficiency of intelligence; he understood what was said to him, and copied printed words in written characters, but had not apparently associated the written sign with the verbal sound so as to understand written or printed words, though, curiously enough, he did this in the case of numerals. The failure seemed to me to consist in an absence of the faculty of mental rehearsal of phrases; he could not formulate volitions in words, or as Dr. Hughlings Jackson has put it, he could not propositionize.

CASE 5. *Partial right hemiplegia with loss of speech, apparently from embolism.*—Sarah Ann C—, æt. 22, married, was admitted into St. Mary's Hospital May 5th, 1866. She had been confined of her first child two months before, losing much blood afterwards, and she had since had neither spirits nor strength, and had been unable to suckle her child. At about midnight on Friday May 4th, she leaped out of bed and fell down, the fæces and urine escaping involuntarily. It could not be ascertained whether there had been any convulsions, but she was lifted into bed in an unconscious state, and was so found by her mother, my informant, in the morning. She neither spoke nor moved, and her head and hands when raised dropped as if dead. On arriving at the Hospital, however, she was tossing her arms about, and muttering "No" to all questions. She was considered by the house-surgeon to be hysterical and treated accordingly; but in the ward it was noticed that she did not move the right arm so freely as the left, and that her face was drawn to the left when she smiled. In the evening she got out of bed and walked to the door of the ward, was caught by the nurse, treated with cold water, after which she became quiet and passed a good night.

There was evidence of paralysis in the right face; the patient could move the right arm freely, but had only a very feeble grasp. She could walk, but dragged the leg; the

evidence as to sensation was uncertain. The only word she could utter was "No," but she signified yes and no by signs. she did not seem to understand fully all the questions put to her; was very emotional but struggled against the tendency and controlled herself well. She could write her name, but nothing else.

In a week, *i. e.* May 11th, she had gained power in the paralysed limbs and acquired a few new words, "Yes," "Nurse," "Nicely."

May 17th.—Has regained more words, but as she acquires some loses others. Repeats perpetually and often quite *mal à propos* "just like that;" repeats long phrases after a particular fellow patient, not after any one else. Mental condition peculiar and difficult to characterise. She understood what was said to her, did not seem to notice what was said about her; very emotional, exhibiting her feelings by exaggerated facial expression and by gestures, but did not give way to them; sobbed sometimes when told she might recover, or when her child was spoken of, but did not cry. Her mother coming in showed her the child's petticoat; she started, pushed it away with an expression of aversion, exclaiming "No," and turned away, taking no further notice of her mother, though I was talking with her for some time. Afterwards, when asked if she would like to see the child, seemed affected and indicated a wish to do so.

She improved in speaking, and by May 25th was able to carry on a conversation, though occasionally at a loss for a word. She had always looked ill and now became rapidly worse; the urine was highly albuminous, œdema of the lungs and general dropsy came on, and she died early in July. Unfortunately no post-mortem examination was permitted.

CASE 6. *Right hemiplegia with loss of speech and writing apparently from embolism.*—George L—, æt. 29, single, a coachman, was admitted under the care of Dr. Sieveking, April 3rd, 1870. Had fits when a child, last at the age of seven; rheumatic fever twelve months ago, after which he was quite well for six months, but for the last six months he had com-

plained of numbness and coldness in the right leg, had constantly sought the fire, and had fallen off in his appetite.

He was at work up to two days before the attack, but lately looked bewildered. During the two days he had not been able to work, he talked incessantly all sorts of nonsense; said the room and various objects were larger than natural. "Oh my, how big the table is, and the chairs," then laughed; told ridiculous stories.

The attack came on in the night, his brother awoke and found him in violent convulsions, mostly of legs, not more one side than other; face drawn, eyes wild, stertor, frothing at mouth, no cry. The attack lasted two hours; when it was over right hemiplegia with loss of speech established. On admission the paralysis was complete, the loss of speech absolute; and he could not protrude the tongue. He gradually gained some power in the leg so as to be able to walk about, but the arm remained motionless and flaccid. He could now also say yes and no, but was not always right in his use of these words. On one occasion he twice said "Here," to his sister when impatient that she had not complied with his wish for her to come to him. Could write his name but nothing else, and wrote it when asked to write an answer to a simple question. The case presented no peculiar features, and is here recorded partly as an example of a rather unusual type of attack in embolism, partly for the purpose of noting that the patient while in the condition described read the newspapers much with apparent interest, and at my request he pointed out a Crystal Palace advertisement of fireworks, and an account of pigeon shooting at Hurlingham, the latter very promptly and with a pleased expression, as if he had already read and enjoyed it.

CASE 7, Right hemiplegia with loss of speech and writing, presenting some peculiarities.—Herman R—, æt. 34, a German, goldsmith, said to be very clever at his work and intelligent, was admitted into St. Mary's Hospital under the care of Dr. Sieveking, February, 1870.

He had given way to alcoholic and venereal excesses. Had

acute rheumatism in 1865, and had since suffered much from pain in the limbs, especially within the last month. He had had much headache also, and a fortnight previous to the attack had fallen down in the Park.

On Friday, February 6th, he fell off his stool while at work, was unconscious for about five minutes, then came to himself, but seemed powerless and answered questions reluctantly and indistinctly; he groaned much; no convulsion. A friend (German) who saw him next day had some difficulty in understanding what he said, and thought he mixed up English and German without knowing it. His landlady who attended on him did not notice this. On Sunday evening, February 6th, he was found to have lost the use of the right hand and arm and to be unable to speak at all. Notwithstanding this on Tuesday morning (the 8th) he got out of bed, dressed, except coat, shoes, and socks, went down seventy-two steps to the kitchen, where he sat down, and then, on being remonstrated with by his alarmed landlady, walked back, undressed and got into bed; all this without resistance and without saying a word. On the evening of this day he was brought to the hospital and was found to be incompletely hemiplegic on the right side and unable to answer questions so as to be understood. He soon began to improve and my notes on the 14th are as follows:—All his answers in a low smooth tone, without modulation of voice, he could not be induced to utter loudly even a word he could say. Answered "Yes" and "No;" told me his age correctly and his name, but indistinctly. Asked how he is, replies "better" or "quite well" rather indistinctly. "If he had pain in the head since the attack?" "No." Before, "Yes, wonderful." If he slept well, "Nicht" . . . something or other which could not be made out. If appetite good, "No." What he liked best, a gesture expression of disgust, with words which could not be identified. It was impossible to understand him when he attempted a phrase, or when he tried to say anything to which I had no clue. He laboured through the title-page of a book given him to read, but, without looking at the book, only one or two words would have been recognised. A peculiarity of his

attempts to read or speak was his persevering effort to master a word, syllable by syllable, by trying on and on again. For example, when asked to read the words diet-card his attempt was something like this, diget, dicht, dite, dite, dite car. The next moment he pointed to his name, saying, without hesitation though not very distinctly, "dat my name." A strong German accent was distinguishable in all he said, whereas before the attack he spoke English particularly well. Up to this time and a week later, February 21st, he could not sign his name, or write the simplest word such as yes or no when asked to do so, or copy a word pointed out to him. He remained in the hospital some weeks longer, recovering very fair power in the limbs, speaking better but very unequally at different times, frequently, however, energetically and with gesticulation. Within the last few days of his stay he replied "garz wohl" for very well, and told me a long story in German, as I suppose, but in English as he insisted, of which I did not understand a word. He could now with great effort write his name.

The following case is a remarkable one.

CASE 8.—*After an acute cerebral attack absolute inability to read printed or written words (except own name), while the patient wrote correctly from dictation and composed and wrote letters with a little prompting. Inability to recall the name of the most familiar object presented to his sight, while he conversed intelligently, employing an extensive and varied vocabulary, making few mistakes, but occasionally forgetting names of streets, persons, and objects. Death from apoplexy; extensive atheroma of cerebral vessels; old clots in substance of left hemisphere, with softening of adjacent substance to outer side of lateral ventricle at junction of descending cornu. Recent hæmorrhage in same situation.*—Charles D—, æt. 59, a gas collector, and member of the Paddington Vestry, came under my observation at St. Mary's Hospital on May 8th, 1871, under the following circumstances:—He had seen an accident in the street, and came to the hospital for the purpose of giving information, the case having been

admitted. His embarrassment of speech was noticed by the out-patient porter, who recommended him to see me next day. His first complaint was that he was unable to read; "I can see them," pointing to words, "but cannot understand." In reply to my questions he informed me that he had been a gas inspector, had "always been hearty till over-worked," had been ailing eighteen months or more, and at one time very dangerously ill. I found he could not remember names, and I put down in my notes that he sometimes answered questions quite irrelevantly, *e. g.*, asked if illness came on suddenly, began to speak of "right hand of grove," and was evidently trying to recollect the name of some street or of medical man. Later I discovered that "right hand of grove" referred to the residence of Dr. Algernon Norton, who had attended him in the attack he was trying to tell me of, and that the irrelevancy was only apparent. He tried to give me an account of the accident respecting which he had come to the hospital, but I was unable to make out what it was, partly at least, because he wished to include in it the name of the street in which it occurred and could not recollect it. On the other hand, he gave me a lucid description of an accident which had occurred to him as captain of a volunteer fire brigade, in which he, his son, and some of his men, had been caught beneath falling timbers, two men being killed and himself nearly burnt to death.

He was a fine well-built man, with dark curly hair and a good colour. He had a very intelligent face, and had evidently been possessed of great energy and force of character, taking a very active part in all public affairs, and much respected by all classes. He had been captain of a volunteer fire brigade, was an efficient volunteer when taken ill, and had for many years been elected to the Paddington Vestry where he was prominent and influential. He took a good deal of alcohol but did not get drunk.

He had never been quite the same man since the accident at the fire seven or eight years before, but had been in good health, except that for years he had been subject to head-

aches, especially after worry, till January, 1870, when he had stoppage of the bowels from hernia. He recovered and resumed work, but "a fortnight before the Easter Volunteer Review," he was seized with sickness, vomiting, and pain in the head. The pain in the head was very severe, at one time in the temple, at another in the occipital region. He was delirious and restless, and did not know his wife for a fortnight. He gradually recovered, but after this attack was unable to read either print or writing, but could write quite well. He went on a visit to Chatham for change of air, and wrote good letters to his wife, my informant on the points now related. He told me later, however, that his sister used to assist him by hints. At Easter, 1871, he had pain in the abdomen, and after that time had not been able to write a letter, though he wrote correctly from dictation. He cannot bear a noise of any kind; no fits.

When tested as to his power of reading by means of the hospital out-patient card he was quite unable to make out St. Mary's Hospital printed in large type. He pointed to the letters one after another, and seemed to be making great and almost painful efforts to name them, but in vain. He said he could see them well enough but could "not understand them," could "not recollect them," could "not get them into his mind-box," employing these various phrases. At the same time he signed his name promptly, wrote "I can not do read;" when asked to say in writing that he could not read (the "do" I think is accounted for by a change in expression suggested to him). He wrote from my dictation out of a vestry circular he produced, "The clerk to read letters and other communications," and on another occasion "This is to certify." He also took notes of my instructions, and of the day and hour of subsequent visits, which I saw were correct, telling me that he was very forgetful and might make mistakes. He would be utterly unable an hour later to read his own writing, but he relied on his wife making out the notes he took.

He recognised his own name, whether printed or written, but could not be sure whether the initials or full Christian

names were given. He produced a printed list of the vestrymen and pointed out his name in it; recognised it again at once, written on the hospital card. When asked what the other writing on the card was, he inferred that it was the date (May 8th); counted on his fingers January, February, March, April, *May*, then stopped and said, "It must be the 9th."

He told me he forgot the names of places and persons, "the names of these," pointing to his legs and arms, and when asked he was unable to name his limbs. While he was trying to do this in an early part of his first visit, he said he came to know my name from that of Mr. Broadbridge of the vestry, adding, "Is that your name, sir?" On another occasion, said he could not recollect the name of these articles, taking hold of his coat. When I touched his coat and said, "Why, these are your trousers," he said at first "Yes," but then corrected himself, and said "Coat." On asking him just afterwards to name his finger, he muttered "Coat—hat—boot," then remained silent, trying to recall the name. I said, "It isn't your thumb, is it?" He said, "Yes, thumb," but saw his error, and went on trying other words, and at length found "Finger."

Tested with various colours, he could not bring the name of the colour to mind, but when it was mentioned, he pounced upon it at once. Asked if an orange-coloured card was blue, green, &c., said "No." Red, "Well, it is more red than anything else." Orange, "Yes," promptly, "Orange."

Tested by a circle and square, could not name either. When asked if the square was a circle, he said, "No, but that is," pointing to the proper figure.

On being asked how he spent his day, he replied, "Miserably;" explaining that he was formerly very active, and now had nothing to do; but he employed himself in anything he could find, "cleaning boots," &c. &c. He always attended the meetings of the vestry; he did not feel competent to take part in the discussions as he used to do, but it amused him, and he added, "but I daresay I am as useful as a good many of them still."

He went out a good deal and found his way about the

streets, taking care not to be out at night. At a railway station could not remember where he wanted his ticket for, except sometimes when going to Chatham.

Formerly he liked to have the newspaper or a book read to him. Cannot bear it now; "cannot understand properly;" "cannot calculate what is said;" cannot follow the sermon at church, asks his wife to cut the prayers short.

The case may appear rather prolix, but I think it important to omit nothing which may throw light on the mental condition of the patient. He was under observation till June 1st, and my notes of various interviews are condensed and arranged. He was a remarkably intelligent man, cheerful and energetic, even under his affliction; he employed in conversation a very extensive vocabulary, usually speaking fluently; sometimes stopped for want of a word, usually a name, rarely using wrong words, for which I was on the look-out, the only ones I have notes of being "soup" for "supper," "nephew" for "grandson."

He ate, drank, and slept well; had no pain, complained only of feeling weak. He was said to be thinner than he had been. There was no cardiac murmur; no sugar and no albumen in the urine, the sp. gr. of which was 1010.

He took Hyd. Bichlorid., gr. $\frac{1}{16}$, with bark, three times a day, and was thought by himself and by his wife and sons to be improving in his recollection of names, &c.

On the evening of June 21st he went to a vestry meeting and returned in unusually good spirits. He had up to that time been much the same, and in the morning had counted accurately £47 in silver. At 10.30 p.m., just after his return from the vestry, he was left alone in a room for a short time, when groaning was heard, and he was found on the floor. He was not absolutely unconscious; when seen soon afterwards by Dr. Dale the pupils were remarkably contracted. On being raised into the sitting posture he vomited. A little later he was found by Mr. Herbert Norton and Dr. A. Norton to be quite insensible, and he died at 12.15 on June 23rd.

Post-mortem examination of head only permitted. Omitting unimportant particulars, the veins of the hemispheres



were full. All the arteries, especially the basilar, most extensively diseased. Opacities everywhere; coats rigid; no obstruction. Pia mater thickened and opaque, especially over the upper part of the hemisphere posteriorly to the sulcus of Rolando on both sides. Membrane over fissure of Sylvius thick and tough on both sides, and over calcarine and internal parietal fissures on left side.

A red patch, caused by a thin layer of recently extravasated blood, was seen round the anterior end of the fissure of Sylvius on the right side, extending over part of 3rd frontal, anterior parietal, and infra-marginal convolutions, but not penetrating into the sulci or fissure.

Portions of convolutions cut out from the left hemisphere at the margin of the great longitudinal fissure just behind the sulcus of Rolando, showed the gray matter thin, pale, and shading off into the white substance. Elsewhere the gray substance was well characterised.

The left hemisphere was soft and boggy to the feel, and the convolutions flattened. Blood was seen to have issued from the fourth ventricle between the medulla and cerebellum, and to have spread over the posterior part of the cerebellum, which on further examination proved to form part of an enormous extravasation, filling all the ventricles, but especially the left lateral ventricle, in the wall of which was the aperture by which it had entered the central cavities. In this ventricle was a clot of the size of a child's fist; the thalamus and corpus striatum were completely broken up; the blood had, in addition to this, penetrated into a large cavity in the temporo-sphenoidal lobe, which had apparently been partly formed by softening, but extended by the hæmorrhage, its anterior part being smooth, its posterior part ragged. It was on the outer side of the descending cornu, reached to within three quarters of an inch of the apex of the lobe anteriorly, posteriorly to about the junction of this lobe with the occipital, and its walls exhibited an interesting natural dissection of the fibræ propriæ of the convolutions on the under surface of this part of the hemisphere. In the outer wall of this cavity were found two old clots; one about

the size and shape of an almond was loosely embedded in the infra-marginal gyrus between the deep parallel sulcus on one side and the secondary small gyri on the lower wall of the fissure of Sylvius on the other, about opposite the junction of the upper third with the lower two thirds of the descending cornu. The other was farther back and on a higher level, almost exactly corresponding in situation with the posterior end of the fissure of Sylvius externally, and with the junction of the descending cornu with the body of the ventricle internally; in fact, it occupied the thickness of brain substance separating the extremity of the fissure from the ventricle. It was about the size of a bean, yellow, very tough, fixed by puckered pia mater and by vessels entering the brain substance at this point, and it formed part of the wall of the great cavity in the temporo-sphenoidal lobe, the brain substance around it being softened. No abnormal appearances in any other part of the encephalon.

It is to the clot last described that I wish to call particular attention. From its relation to vessels entering the substance of the hemisphere, and from its position with respect to the cavity in the temporo-sphenoidal lobe, I consider it to have been the cause of the softening of which there was here evidence. Unfortunately the extent of the softening could not be ascertained in consequence of the recent hæmorrhage which had ploughed up the lobe. The blood recently effused must either have come from the wall of this softened portion, and thence burst into the ventricle, or have penetrated it early, since it had been entirely excluded from the adjacent descending cornu by pressure from the cavity, which lay along its outer side, while all the other cornua on both sides were greatly distended by it. But the clot, moreover, occupied a very important situation in the hemisphere, and would involve important sets of fibres, viz. the fibres from the thalamus, crus, and corpus striatum (named in the order of their abundance), which curve round the upper end of the descending cornu to the occipital lobe, and also the fibres which, converging towards this point from the infra-marginal and parallel gyri of the temporo-sphenoidal lobe, here curve

upwards and turn forwards deeply in the parietal lobe to be distributed to the parietal and frontal convolutions. It would involve also fibres of the corpus collosum, both from the body of this commissure and from the reflection which I have called the commissure of the hippocampi, passing mainly to the temporo-sphenoidal lobe.

I do not, of course, conclude that the peculiar affection of the mental faculties exhibited by this patient were due to this hæmorrhage and the adjacent softening, but I point out the coincidence of a peculiar and important loss of function with lesion in an important knot of cerebral fibres, in the hope that attention will be drawn to the point and further evidence obtained.

CASE 9. Temporary loss of comprehension of spoken words after apoplecticiform seizures.—Miss O—, a maiden lady, æt. 58, was seen by me in consultation with Mr. Wall, October 29th, 1870. She had fallen down unconscious about ten months previously, recovering herself immediately. On September 12th she was found lying on the floor insensible and breathing stertorously, bleeding also from the nose. On regaining consciousness her naturally cheerful expression was exchanged for a dull stolid look; she took no notice of anything; did not seem to understand what was said, *e. g.*, when told to put out tongue, said: "Yes," and "I think so," but did not obey. Her entire speech consisted of a few short habitual expressions, such as "Yes, indeed," which she used without the least reference to what was asked. No paralysis; no cardiac murmur; no albumen in urine. She recovered her speech and intelligence and natural expression gradually in a few days to a very considerable degree, but was sometimes at a loss for words, had forgotten many names, and complained of deficiency in her memory generally.

On September 28th she had another similar, but less severe, attack, from which she recovered up to the same point; but on the 29th she was seized with pneumonia, which ran its course in about three weeks. She had lost her usual cheerfulness and sometimes cried, often missed out

words in speaking, and was annoyed at it, and constantly made remarks without any obvious meaning.

On October 28th was seized with sickness early in the morning; fell into a state of semi-coma; did not recognise any one; could not be made to speak. When I saw her next day with Mr. Wall she sat up in bed, knew her friends, took notice of all that passed, but did not seem to understand what was said. She gave brief replies, always utterly inappropriate, using few words, but pronouncing them distinctly. On the other hand, she seemed to comprehend signs perfectly; put out her tongue promptly when her chin was touched, after having been repeatedly asked to do so in vain; held out her hand when I approached mine to feel the pulse, &c.

She again recovered up to a certain point, but on November 3rd was attacked with bronchitis, from which she died on the 5th. No post-mortem examination was permitted.

CASE 10. Lead-poisoning; gout; epilepsy; right hemiplegia with loss of speech and of comprehension of language. Hemiplegia transient; loss of speech permanent; death from albuminuria and gangrene of left foot.—W—, a painter æt. 42, was seen by me with Dr. Felce, December 14th, 1871. He had had lead colic twenty years before; had been subject to gout for ten years, relieved from time to time by a specific tincture, but causing chalk stones in his knuckles and in the end of the thumb he used for graining. Three years before, in bed three months from rheumatism, so called, and unable to work for six months. Since then one week at work, another laid up by gout or rheumatism. For four or five years subject to epileptiform attacks at intervals of two to six months, always coming on at night. General bilateral convulsions with tongue-biting, followed by stupor.

During the night of October 14—15th, while lying on the right side, suddenly put out the left arm and began to jabber; then took hold of his right arm, which was quite useless. No convulsions; no loss of consciousness. He was found by Dr. Felce, who was called to him, completely hemiplegic, with

greatly impaired sensibility, keeping up a meaningless gabble, in which m-sounds were predominant, and showing the paralysed arm. The attack was followed by much cerebral excitement shouting, violence, &c. He soon regained power in the right limbs, but the speech was as imperfect as ever, and he was unable to write or to copy. Ulcerations were produced by very slight pressure about the right ankle and foot, and he suffered successively from severe jaundice, two or three attacks of gout, which were speedily relieved by iodide of potassium, spots of purpura over the entire surface, great œdema of the leg and scrotum, and finally gangrene of the left foot came on, preceded by intense pain in the whole limb. The urine was albuminous.

When seen by me with Dr. Felce on December 14th, he had for two or three days been very violent at times; had got out of bed repeatedly, notwithstanding the gangrenous state of the foot, had thrown a chamber utensil at his wife, and had sometimes shouted till completely exhausted. He received us with a profusion of bows and smiles, with gestures expressive of welcome. He looked much older than his years; was thin, and his eyes were yellow, but not his skin. He was apparently very cheerful, smiling, mumbling, gesticulating, winking with first one eye and then the other, and often showing the sclerotic above the cornea, all these being old tricks. His wife said he was more like a foreigner than an Englishman in these respects. His speech was a mere jabber, in which "Ma" and "Mum" were prominent, and was accompanied with an excess of gesticulation, smiles, and facial expression. The gestures were very striking and apparently appropriate when we had a key to their meaning, as, for example, when he wished his wife and sister to leave the room while he showed the state of his scrotum. It was stated that he said "Yes" or "No," and "Oh, my" at times; but he did not use even these simple words before us. He was unable to write his own name when his signature was before him. When urged to do so scribbled off rapidly something in which letters of some sort were distinguishable at first, but then tailing off into a scrawl.

He obviously did not understand anything that was said to him, did not squeeze my hand on repeated requests, but went on shaking it and smiling; put out his tongue repeatedly when told to close the eyes, but instantly imitated the act after Dr. Felce, &c. It was doubtful how far he recognised the state of his speech; he went on chattering as if he thought he was understood, but he also made signs. He howled loudly and long, and looked very fierce when the foot was uncovered for inspection.

There was very slight evidence of right hemiplegia in the face and arm. Pulse frequent and weak. Heart's action disproportionately powerful. No murmur, but first sound prolonged, and heart enlarged. Urine albuminous. Sp. gr. 1015. He remained in much the same state till his death, about Christmas, once startling some friends in conversation at his bedside by exclaiming "Exactly" at a very appropriate moment, but not otherwise regaining speech. No post-mortem examination was made.

The cases related, so far as they bear on the question, are entirely corroborative of the view which assigns a close functional relation with articulate speech to that part of the upper edge of the fissure of Sylvius which forms the posterior end of the third frontal convolution of the left hemisphere. If this were the object of the paper I could give many similar cases, while I have not met a single example of an opposite kind. The question being one of primary interest in cerebral physiology, I have examined all the apparently exceptional cases of which I have been able to find the published record; and it is remarkable how large a proportion of them break down under careful scrutiny. Setting aside the distinction between the conditions to which the terms amnesia and aphasia have been applied, I have found, described under the head of aphasia, cases of labio-glossc-laryngeal paralysis on the one hand and of dementia on the other, and again the speechlessness or indistinct articulation of patients who have never fully recovered from the shock of an apoplectic or convulsive attack, or of embolism of a large cerebral artery. Cases are quoted as examples of

aphasia without disease of the left third frontal convolution in which the left middle cerebral artery, the nutrient vessel of the part, was blocked up; in which, therefore, the persistence of speech would have constituted a graver objection to the views in question, than its loss; or in which, without apparent disease of the surface gray matter, the convolution was cut off from the central ganglia and the rest of the cerebrum by lesion of its white fibres; in some instances again the aphasia has been fugitive, and therefore dependent on some temporary condition, and yet the cases have been considered exceptional because no permanent lesion has been found after death. On the other hand, cases have been described as examples of disease of the left third frontal gyrus without affection of speech in which the description of the lesion clearly shows that the observer has taken some other convolution for the one named.

One or two examples only of coincidence of loss of speech with lesion of a given part of the cerebral hemisphere, unless their significance were entirely destroyed by the association of similar functional loss with lesions in other regions would suggest that the part in question was in some way concerned in the function of speech. In the case of that part of the upper edge of the fissure of Sylvius of the left hemisphere, which forms the posterior extremity of the inferior frontal convolution, the examples of coincidence are so numerous and the exceptions so few (some of these exceptions, too, occurring in left-handed subjects, when taken in connection with the hypothesis which makes the use of the left hemisphere in speech a concomitant of dextral pre-eminence, becoming strikingly corroborative), that it appears to me as reasonable to deny that the valves of the heart direct the course of the blood because we sometimes meet with cases in which the circulation has been carried on, notwithstanding changes in the valves which seem to have rendered it mechanically impossible, as to deny in the face of existing evidence that the convolution in question is in some way concerned in speech.

So much, then, will be taken for granted in the course of this communication, but it is not therefore to be supposed

that lesion of this part of the hemisphere will be found in every kind of loss or derangement of language. It is not the seat of a "faculty of language," but simply a part of the nervous or cell and fibre mechanism, by means of which speech is accomplished, which mechanism may be damaged elsewhere above or below this particular node.

Previous writers (Bastian, Hughlings Jackson, W. Ogle, Sanders, and others) have pointed out that there are at least two distinct classes of cases in which speech is deranged or lost. 1. The amnesic or amnemonic, in which the patient has forgotten words; the idea no longer evokes the symbol, even in thought; the mental rehearsal of phrases is imperfect. 2. The ataxic or aphasic, in which the patient apparently remembers words, and rehearses sentences in his mind, but has lost the power of utterance; he has forgotten how to say words." Obviously, in these two classes of cases, the breach in the apparatus has occurred at quite different points. In amnesia the expression of an idea is interfered with at an earlier part of the "way out" than in aphasia, the defect is more strictly mental. To look for lesion in precisely the same part of the hemisphere in both cases can only lead to confusion, and confusion has thus arisen. Again, in each class the functional derangement may be (1) paralytic or (2) incoördinate. In paralytic amnesia the subject will have forgotten words, but will say them when they are suggested to him. In incoördinate amnesia he will have plenty of words, but will use wrong words, having probably little relation in either sound or sense to the words required, and he will be unconscious of the mistakes. In paralytic aphasia the patient will have lost the power of utterance, more or less completely, and will be unable to repeat words spoken in his hearing; in incoördinate aphasia he will use wrong words having some traceable relation to the word required, and he will be conscious of his mistake and try to correct it. Commonly two or more of these conditions are combined in various degree, and sometimes, in the course of a case, there is an apparent transition from one form to the other; for example, atactic aphasia may be recovered from, revealing

amnesia, as in Case 2 in the paper. Dr. Hughling Jackson, who has insisted on the distinction between atactic and incoördinate affections of speech, has also pointed out that the one will probably depend on destruction of gray substance or white fibres; the other on instability of cells in cortical gray matter.

There is room, however, for further analysis of the conditions included under the term amnesia, which will be the more easily followed by reference to Case 8, that of Dunford. Here the mental powers were comparatively little impaired; the patient retained his shrewdness and humour; he conversed extremely well and wrote well; the faculty of intellectual expression was almost intact; but he was quite unable to read or even to name a single letter: and while the names of things came readily into his mind in the course of conversation, when he was asked the name of an object presented to his sight he could not recall it. Thus, while an object seen no longer evoked the appropriate name, the name and the object being presented simultaneously, were recognised as pertaining the one to the other, and the name recalled to mind the object. The visual image existed in the mind, the name existed in the mind, but the channel through which the former called up the latter was interrupted; on the other hand the channel by which the name recalled the image remained open. Naturally the defect was most conspicuous in the case of printed or written characters, as they are seen and remembered only in relation with intellectual symbols or words, and as visual objects are entirely subordinate. In other words involving more of theory, the supreme centres and the outward path from them to the proper motor centres were unaffected, but the upward track from the visual perceptive centre was cut across.

Let us suppose an analogous condition with respect to articulate sounds—a severance of the auditory perceptive centre from the supreme or intellectual centre—so that spoken words no longer recall the mental conception with which they were previously associated. Words will now have lost their meaning, and it is conceivable

that a patient may be capable of reasoning correctly ; but as the language of others will have no meaning for him, and as he has no check whatever upon his own words by the sense of hearing, and will thus have no idea whether he is saying what he wishes or not, he will be completely cut off from his fellow men unless, which is not likely, he can still read and write. It seems to me probable that cases of this kind occur, and that Cases 9 and 10 may be examples, as also the remarkable case quoted by Dr. Bastian from Dr. Banks.

Both as to mental condition and seat of lesion these cases would be different from amnesic and aphasic cases, the lesion occurring in one class in a part of the afferent nervous apparatus between the senses and the intellectual centres ; in another in the intellectual centres themselves ; in the third in the first part of the efferent nervous apparatus between the supreme centres and the motor ganglia.

Before I attempt to explain the hypothesis I have to advance as to the mechanism of thought and speech I must give a brief outline of what I consider I have made out respecting the arrangement and distribution of the fibres of the cerebral hemispheres which form a part of that mechanism. My own researches have been mainly concerned with the fibres after they issue from the great central ganglia, the thalamus and corpus striatum, but the relations of the crura cerebri with these ganglia cannot be entirely left out of the consideration. It may be taken as established, more especially after the recent investigations of Meynert, that a large portion of the fibres of the crura end in the cells of the corpus striatum and of the fibres of the tegmentum in the cells of the thalamus, while new fibres start in these ganglia and pass to the convolutions of the hemispheres. I do not accept the statement that all the fibres of the crus thus terminate, as I have repeatedly demonstrated the fact that many fibres, both of crura and tegmentum, proceed to the convolutions without ever coming into relation with the gray matter of either of the central ganglia. I should add that from their position in the crus these fibres probably come from the cerebellum or from the gray matter of the pons. At their exit from the

outer side of the corpus striatum and thalamus as the *corona radiata* the fibres from these two ganglia (and from the crus) become mixed up together so as to be indistinguishable, and no separate distribution can be traced except in a few situations, and they seem in fact to be distributed together to the same convolutions, though in different proportions. That such is the case is rendered more probable from the fact that certain convolutions, as for example, at the apex and outer edge of the temporo-sphenoidal lobe are reached by fibres from both corpus striatum and thalamus by totally different routes.

A further difficulty in the individualisation of distinct tracts of fibres arises from the interlacement of a part of the fibres of the corpus callosum with the radiating fibres emerging from the central ganglia, immediately on their exit. The fibres of the corpus callosum apparently connect symmetrically corresponding convolutions of the two hemispheres. At the outer edge of the lateral ventricles they meet the radiating central fibres, and the two sets of fibres are henceforth undistinguishable being apparently distributed to the same portions of the surface gray matter, this conclusion being corroborated by a consideration similar to that just mentioned with respect to the thalamus and corpus striatum, namely, that at certain parts, fibres radiating from the ganglia and fibres crossing transversely from one hemisphere to the other in the great commissure, reach the same point by different routes. Taking, then, central and callosal fibres together, without attempting to distinguish between them for the moment, it may be stated with confidence that they are not distributed uniformly to the convolutions, but that, on the contrary, there are extensive tracts of convolutions which receive no central or callosal fibres whatever. The convolutions to which these fibres pass are those forming the inner and outer margins of the hemisphere¹—the margin of the great longitudinal fissure on the one hand, and on the other, the margin formed successively

¹ It may be here remarked that the modern current topographical classification of the convolutions is condemned by the disposition of the fibres, as it is also by inconsistency with the order of development.

by the third frontal, the upper edge of the fissure of Sylvius and the gyri along the same line to the occipital extremity of the hemisphere. The apex and the two margins of the temporo-sphenoidal lobe are reached by central and callosal fibres fewer in number and totally different in their course and mode of distribution. With the exception of the tip of the occipital lobe the proportion of central and callosal fibres increases from behind forward. I have already stated that these radiating and commissural fibres are so interwoven together as not to be followed separately, and they pass to the same parts of the surface of the hemisphere, but, while this appears to be the case, the fibres of the corpus callosum are distributed chiefly to the margin of the great longitudinal fissure, the fibres from the crus and central ganglia to the outer or Sylvian margin.¹ The convolutions which are not in immediate relation with crus, central ganglia or corpus callosum by means of fibres are those of the Island of Reil, those on the under surface of the temporo-sphenoidal lobe, and of the orbital lobule, those on the flat inner aspect of the hemisphere, and those along the middle of the convex surface of the hemisphere from the occipital extremity as far forwards as the first ascending parietal gyrus (the second frontal appears to have central connections although in a less degree than the first and third). These tracts of the hemispherical gray matter are only indirectly connected with the ganglia and great commissure by means of fibres passing to the convolutions in direct communication with them. A large proportion of the white substance of the hemisphere consists of commissural fibres which associate together different parts of the surface gray matter, the superficial strands connecting neighbouring convolutions, the deeper layers uniting more distant points. Their general

¹ When the corpus callosum is first formed it is continuous only with the flat inner surface of the hemisphere, which at this period is a hollow sac, while the continuity between the hemisphere and the central parts exists only in the outer wall around the fissure of Sylvius; and, although at a later stage of development, fibres are formed between the corpus callosum and the outer margin, and *vice versa*, the predominant distribution of central and callosal fibres is to the parts with which they were originally connected.

direction is longitudinal and neglecting details they fall into three great longitudinal systems—(1) that of the fasciculus uncinatus by which the convolutions below the level of the fissure of Sylvius are associated from the occipital to the frontal extremity of the hemisphere; (2) that of the gyrus fornicatus described by the late Mr. Solly, and called by him the superior longitudinal commissure; and (3) the great axial longitudinal system of the hemisphere lying in the angle formed by the radiating and callosal fibres as they diverge to reach the upper and outer margins of the hemisphere respectively. In the system of the gyrus fornicatus are fibres which turn upwards round the splenium corporis callosi from the inner margin of the temporo-sphenoidal lobe, and a corresponding but more important mass of fibres bends inwards and upwards from the external convolutions of this lobe to turn forward in the very axis of the parieto-frontal part of the hemisphere, and distribute itself to the convolutions on the convex surface.

Now the convolutions which I have enumerated as having no direct communication with the crus, central ganglia or corpus callosum are, in the first place, those which are latest in order of development, and on this ground alone might be supposed to be concerned in the more strictly mental faculties which are latest in their manifestation; they are again those which constitute the difference between the human cerebrum and the cerebrum of the quadrumana; and it would, moreover, seem to accord with the general plan of construction of the nervous system and with what we know of the mental operations, that these convolutions which are withdrawn, so to speak, from direct relation with the outer world should be the seat of the more purely intellectual operations, receiving the raw material of thought from the convolutions on which sensory impressions impinge, and employing for the transmission outwards of the volitional product those convolutions which are in communication with the motor ganglia and tract.

The hypothesis I advance as to the mechanism of thought is essentially that of Dr. Bastian, which in effect I

adopt, giving to it, however, an important extension, and applying it also to the facts of cerebral structure. The essential points in Dr. Bastian's hypothesis I condense from his paper "On the Muscular Sense and on the Physiology of Thinking" in the 'British Medical Journal' for May, 1869, employing as far as possible his own words :

1. It is presumed that in the higher phenomena of mind, which are dependent upon the cerebral hemispheres, certain definite parts of these are always called into activity whenever similar mental operations are repeated.

2. That when past impressions are revived as ideas or recollections, precisely the same parts of the hemispheres, the same nerve-fibres, and the same nerve-cells, must be called into activity, as were previously concerned in the perception of the original impression.

Here I shall have to introduce a qualification or add an explanation later.

3. That the several sense-centres at the base of the brain and in the medulla are connected in a perfectly definite way each with its own set of cells in the cortical substance of the hemispheres; these cells, in connection with the several sense centres constituting their respective "perceptive centres."

"In the perceptive centres the primary impressions made upon the organs of sense are converted into 'perceptions proper;' that is to say, they receive their intellectual elaboration, and this elaboration implies an intimate cell and fibre communication between each perceptive centre, and every other perceptive centre, since one of the principal features of a perceptive act is, that it tends to associate, as it were, into one state of consciousness much of the knowledge which has been derived at different times and in different ways concerning any particular object of perception. An impression of an object, therefore, made on any single sense centre on reaching the cerebral hemispheres, though it strikes first upon the perceptive centre corresponding, immediately radiates to other perceptive centres there to strike upon functionally related cells; all this taking place with such rapidity that the several excitations are prac-

tically simultaneous so that the combined effects are fused into one single perceptive act."

The full exposition of my hypothesis will occupy the remainder of the paper, but it will conduce to clearness to give here the modifications I make in the hypothesis of Dr. Bastian. It appears to me that the intellectual elaboration of impressions is divisible into two stages. There is a primary or rudimentary perceptive act in which the external cause of a given set of sensations is recognised as such, and in which the simple attributes, as of form, colour, hardness, &c., are perceived. And there is a higher degree of elaboration in which, by the combination or fusion of perceptions derived from the various organs of sense, a conception or idea of an object as a whole is obtained. This is a new and distinct process, and is usually accompanied by the affixing of a name to the object. To the "perceptive centres" I relegate simply the translation of sensations into rudimentary or primary perceptions, and these centres must lie somewhere in the marginal convolutions, which receive radiating fibres from the crus and central ganglia; upon which, therefore, impressions will first impinge, and which are symmetrically combined by the fibres of the corpus callosum. The higher elaboration, the fusion of various perceptions together, and the evolution of an idea out of them, will be accomplished not by radiation of an impression from one perceptive centre to all the others, but by convergence of impressions from the various perceptive centres upon a common intermediate cell-area in which a process analogous to the translation of an impression into a sensation and of a sensation into a primary perception will take place. This intermediate cell-area will form a part of the supreme centre, and will be situate in the superadded convolutions which receive no radiating fibres.

A theory of the mechanism of thought should include an hypothesis as to the nervous change or nervous condition which is the concomitant of consciousness. The hypothesis I have formed is that in the nerve-cells, which are the seat of the particular state of consciousness, there is absorption of

energy and integration of matter instead of the usual liberation of energy and disintegration of matter. Mr. Herbert Spencer has aptly compared the transmission of an impression along a nerve-fibre and the evolution of energy in a nerve-cell when reached by an impression to the firing of a train and explosion of a mine, and the comparison is true so long as the result is reflex action or retransmission onwards or upwards of an intensified nerve-motion. But when the impression reaching the terminal cells of the nervous system does not immediately result in movements, and is not transmitted farther, when, in fact, it gives rise to a sensation "vivid" or "faint," what becomes of the energy which constitutes the impinging impression, more especially, if in the nerve-cells here as elsewhere it determines an explosion? It appears to me clear that the energy of an impression communicated to cells which are the seats of sensation is expended in the production of some constructive change in the cell in the same way as luminous vibrations are fixed by constructive chemical changes in vegetables, and that the permanence of this change constitutes "memory." The seat of conscious sensibility will thus vary. It will be different, or at any rate the seat of the more frequently recurring and more important sensations will be different in different classes of animals. If the upper terminal segment of the nervous system be represented wholly or chiefly by the homologues of the central ganglia, the thalami or receptive ganglia will be the seat of sensations. As the hemispheres acquire relative importance the sensations or impressions will be radiated to their gray matter, and there undergo the primary intellectual elaboration which constitutes the simple perceptive act, or the higher elaboration which constitutes intelligence. Again, in the successive phases of development of the intellectual faculties in the human being there will be a gradual shifting upwards of the seat of the predominant states of consciousness—from the thalami, the seat of the simple rudimentary and general sensations of the infant, to the marginal convolutions of the hemispheres in immediate fibrous continuity with these ganglia as the fibres become differentiated and

the paths constituted by them are opened by use in the child, and the general sensations of the infant are gradually specialised and defined into the perceptions of external nature as the cause of sensations;—finally, from the primary marginal convolutions to the superadded convolutions in which impressions relieve their full intellectual elaboration and highest degree of specialisation as childhood is left behind.

While, however, there is this upward shifting of the seat of the predominant states of consciousness, each of these original seats of sensation retains its elementary property, and many of our states of consciousness are compounded of sensations experienced simultaneously (as I think) or in rapid sequence (as most psychologists would say) in more than one; and in certain circumstances an intense primary sensation as of acute pain dominates the secondary sensations radiating from its seat, (hypothetically) the thalamus, and takes entire possession of the consciousness, the excess of force, moreover, escaping outwards along motor tracts and giving rise to cries and muscular contortions.

The act of "thinking," or of cerebration as it has been called, will consist in the rapid transmission of fully elaborated impressions (here ideas, the product of secondary convolutions) from one cell-area to another in the same or in the opposite hemisphere along the complicated set of commissural fibres ascertained to exist, and this act will become automatic or fall into grooves by repetition and cease to be attended with conscious effort, just as in the case of the simple impressions concerned in learning to walk in another part of the nervous system.

It will be convenient to take first the mechanism of speech.

There are two distinct aspects in which words may be considered; 1, as motor processes; 2, as intellectual symbols. A theory or hypothesis of language must trace their origin or mode of production from both points of view, and show their meeting point.

In the utterance of a word or series of words we have the co-operation of the thoracico-abdominal, laryngeal, guttural, lingual, and facial muscles. This implies the simultaneous

and sequent excitation of numerous nerve-nuclei in the medulla and cord, and a most definite and exact co-ordination of the motor impulses issuing from them. Obviously the action of all these nuclei will be combined and directed by some higher centre.

Now, for movements of the face, tongue, and limbs, other than those of speech, the corpus striatum is known to be the centre immediately concerned. It stands between the hemisphere and the cord, and may be said to formulate into actions, the volitions transmitted downwards from the higher centres, *i. e.*, it selects, so to speak, the particular motor nerve nuclei, which are appropriate for the desired movements, and calls them into action by impulses sent along the fibres passing from it to them. Putting this view into terms of cells and fibres a given movement will be represented by a particular grouping of cells in the corpus striatum, the descending processes of which are continued as fibres to particular nerve-nuclei. According to the character of the movements, general or special, will be the kind of cell-group in the corpus striatum, and the degree of co-ordinating action relegated to the cord; if the movements are general the corpus striatum cell-group will be small, simple, and capable of variation, the descending cell-processes and fibres few, while much will be left to the independent co-ordinating action of the cord; when they are specialised the cell-groups in the corpus striatum will be large, complex, definite, little capable of variation, the descending processes will be numerous, the combined action of various nuclei in the cord and medulla will be effectuated by their means, and little will be left to the co-ordinating action of the cord.¹ Either then the corpus striatum and its cells have the same function in speech as in the other modes of voluntary motion, in which case a word, or more strictly, an articulate sound, would be represented by a particular grouping of cells in this

¹ It is scarcely necessary to point out how this accords with the phenomena of common hemiplegia, the slighter paralysis and speedier recovery in the leg, in which movements are general, as compared with the arm, in which they are more special.

ganglion, the descending processes of which pass to the cells of the nerve-nuclei concerned in its articulation, or there must be two distinct tracts of fibres from the higher centres to these nerve-nuclei, one from the corpus striatum for voluntary movements of the lips and tongue other than those of speech, and another from the frontal convolutions of the hemispheres for articulation. Now words, apart from their use as symbols, differ from other movements of the same parts only in their greater degree of specialisation, and we should not *à priori* expect a totally distinct apparatus to be employed in their production; again, the selection of a word as the proper vehicle of an idea, and the production of the articulate sound by setting in action the requisite movements are two distinct operations, and it is not likely that any part of the hemispherical cortex which we know to be mainly occupied in the various intellectual processes will be concerned in a mere matter of motor mechanism. At first sight, however, the second of these alternatives seems to be most consistent with the facts. We never have permanent loss of speech when the lesion is confined to the corpus striatum of the left side when our hypothetical word-groups therein contained will be destroyed. We frequently have loss of speech when the third left frontal convolution or the tract of fibres between it and the corpus striatum is damaged, this ganglion remaining uninjured. The conclusion seems unavoidable that the word-groups must be somewhere higher than the corpus striatum. A moment's reflection, however, will show that, supposing the third left frontal gyrus to be the seat of word-groups, or to be at least an important station on the "way out" for words, the further downward course of this road lies through the corpus striatum even if the cells of this body form no part of the mechanism, and in extensive lesions of the central ganglia this track for words could not fail to be interrupted, and thus, unless a way round from the left inferior frontal gyrus by the right corpus striatum exist, loss of speech should follow injury to the left corpus striatum. In other terms, if the downward course of words is represented by a continuous tract of fibres from the third left

frontal gyrus through the corpus striatum to the different nerve-nuclei there is no reason why, when this tract is cut across within the corpus striatum, the effects should differ from those of interruption of its continuity above the ganglion. Accordingly, the fact that damage limited to the left corpus striatum does not give rise to permanent loss of speech is equally a difficulty whether we suppose this ganglion to be the seat of the cell-groups representing words or consider that it is merely traversed by fibres, which are the downward channels of words, it being postulated always that the third left frontal convolution is an important link in the outward transmission of language. If, then, as I shall endeavour to show, there are reasons for believing that the word-groups are formed in each corpus striatum, right as well as left, the way round from the left third frontal gyrus to the right motor tract will be equally available in the two hypotheses I have been comparing.

Returning now to words, and considering them as motor processes, they must be detached altogether from their use as symbols and looked upon simply as articulate sounds. We see an example of words acquired as motor processes without reference to their uses as intellectual symbols in the speaking of parrots and other birds; we, again, see words surviving as mere motor processes when all use for them in the communication of ideas has been lost, as in the case related by Dr. Bateman of a woman who automatically repeated everything she heard; or in the case of the priest, quoted by the same author, who, while imbecile and incapable of intelligent conversation, could recite long fables previously learnt by heart. It is one thing for a child to learn to utter a word, it is quite another thing for it to use words to express a meaning however simple. The utterance of words then consists in the acquirement of certain complex movements by imitation. A given articulate sound is heard: in learning to say it the effort is directed to the production of a similar sound; after a certain number of trials the proper adjustment is found, and, in the course of time, by continual practice, the adjustment for the production of any

given sound is reached at once. It is to be observed that the power of adjustment thus acquired is not for words as such but for articulate sounds. A child learning to talk does not say one word well, and another not at all, but pronounces all imperfectly according to the difficulty they present in articulation to the particular child. A new word compounded out of old sounds is uttered at once, the adjustment for entirely new sounds is acquired late in life with extreme difficulty, if at all; witness the unconquerable foreign accent carried into another language. Now the education for this production of articulate sounds is through the ear; the association formed is between impressions on the auditory nerve and movements of the lips, tongue, &c., by which they can be imitated; the grouping of cells, then, in the centre from which motor impulses descend to the nerve-nuclei will take place under the control of the cells in the primary auditory perceptive centre, just as in reflex action, the motor impulses issuing from the cells of the anterior nerve-root are regulated by impressions received by and transmitted from the cells of the posterior nerve-root. The auditory perceptive centre will not be itself the seat of the motor sound-groups since in the general construction of the nervous system the receptive and emissive functions are assigned to different sets of cells, distinguishable according to recent observers, not only by their situation and relation with afferent and efferent sets of fibres but by their form and general appearance. Moreover, movements acquired under the direction of a sense-centre or at most primary perceptive centre, and having in themselves no more intellectual quality than any other movements of the same parts, will be represented by cell-groups in the same ganglion; namely, the corpus striatum and not in the hemispheres. But there is a peculiarity in the nerve-nuclei or sense-centres of the special senses, they are bilaterally associated; this, at least, is especially the case with the two intellectual senses of sight and hearing, and offers an explanation of the absence of unilateral blindness or deafness in hemiplegia with marked loss of common sensation in the limbs and trunk. The fused

nerve-nuclei will constitute a common sense-centre which will send up fibres to each half of the cerebrum, and thus impressions will travel equally to the two hemispheres, and secondary or acquired automatic movements, such as those which give rise to articulate sounds, learnt through these special senses will be bilateral, and especially since the muscles, which are the agents in the production of the movements, are also bilaterally associated; that is to say, in objective terms the cell-groups representing articulate sounds will be formed in each corpus striatum.

The articulatory movements having become by practice automatic, which corresponds structurally to the completed grouping of the nerve-cells, the cell-groups may be variously employed: 1st. In parrot-like repetition of words without reference to their meaning. 2nd. In the exhibition of states of feeling. 3rd. In intellectual expression. That is, some or all of these cell-groups, hypothetically located in the corpora striatum, may be called into action by impressions reaching them from at least three other centres. 1. The auditory perceptive centres; 2nd, the emotional centres; 3rd, the intellectual centres. This will be better understood from a reference to a more simple example. The portio-dura of the 7th nerve is the agent (*a*) in reflex movements, as of the eye-lid; (*b*) in emotional movements, such as smiles, &c.; (*c*) in ordinary voluntary movements of the face. Now we have not a distinct set of fibres in the nerve for each of these kinds of action with a different central distribution; all the fibres of the nerve arise in the cells of its nucleus, and these cells are connected by processes and fibres with, and are called into action by the nucleus of the trigeminus for reflex movements, by some centre which is the outward channel for emotional expression, and by the centre by which volitional impulses are transmitted downwards. The same cells and fibres of the nucleus and nerve may be and are employed in all these forms of movement but differently grouped.

The word or sound groups being formed in each corpus striatum, the groups of the left side will take the lead in speech in consequence of the specialisation of the left

hemisphere for intellectual expression. But, although, according to my observation, there is a more marked and more durable temporary embarrassment of speech in damage of the left than of the right motor ganglion, it is never completely lost when the lesion is limited to the corpus striatum. A way round then must exist by which impulses from the third left frontal convolution may reach the cell-groups in the right corpus striatum. The corpora striata have no proper commissure, and it is doubtful whether fibres in the corpus callosum connect these two bodies as well as the hemispheres, but apparently an indirect route is available by the fibres of the corpus callosum from the left to the right third frontal gyrus and thence to the corresponding corpus striatum. It is probable, indeed, that the two corpora striata habitually act together in speech through this indirect link. A certain time, however, is required to bring the new route into use, which explains the temporary affection of speech when the left corpus striatum is injured. When the lesion extends outwards or upwards from the corpus striatum into the white substance of hemisphere so far as to involve the fibres of the corpus callosum which connect the two inferior frontal gyri, or when the fibres from the left third frontal to the corresponding corpus striatum and those between the two gyri by the corpus callosum are cut across by disease in the white substance of the hemisphere not reaching the corpus striatum, language will be entirely lost. So, again, in extensive lesion of both corpora striata or of the left corpus striatum and right third frontal convolution, or in a variety of hypothetical cases which might be stated. On the other hand, the emotional escape of words in aphasia from lesion of the left hemisphere is easily understood if word-groups exist in the right corpus striatum.

No attempt is made here to explain the almost exclusive employment of the left hemisphere in intellectual expression, but, accepting this as a fact, the highly complex, definite, and special character of the volitions to be expressed in movements will imply an abundant and definite connection

by fibres of some part of the hemispherical cortex with the word-groups in the corpus striatum, on the same principle that the cell-groups in this ganglion communicating with nerve-nuclei in the medulla and cord will be large and definite, and send off many descending processes when the movements to be executed are special and complex; whereas, when the movements are simple and general the cell-groups will be small and variable, and the descending processes few, the co-ordination being relegated to the cord. The anatomical fitness of that part of the upper edge of the fissure of Sylvius which forms the posterior end of the third frontal gyrus for the exercise of an important function, such as that of acting as the outlet for language, consists in the facts that it is one of the marginal convolutions which receives radiating and callosal fibres, and by means of its radiating fibres is in communication with the motor ganglion (corpus striatum) and tract, and that it has the most abundant and complicated connections with other convolutions to be met with in the brain. It receives fibres from the convolutions of the Island of Reil, from the infra-marginal convolutions of the fissure of Sylvius, and from parts posterior to it in the supra-marginal convolution, from the second frontal and first frontal gyri, and from the orbital lobule, also from the two great longitudinal commissural systems, the axial and fasciculus uncinatus, by which it will be brought into relation with the convolutions on the convexity of the hemisphere and on the under surface of the temporo-sphenoidal lobe.

We come now to the consideration of words as intellectual symbols. From this point of view they are, in accordance with Dr. Bastian's theory, remembered sounds, and are probably represented in the auditory perceptive centre by receptive or recipio-motor cell-groups. A degree of persistence, resulting from frequent repetition of the impression, is a condition both of the formation of motor cell-groups for utterance, as already mentioned, and of the use of remembered sounds as symbols. In the act of naming, which constitutes the earliest intellectual or symbolic use of words, as the conception or idea of external objects is gradually formed by

fusion of the visual, tactual, and other impressions to which it gives rise, the idea of the object is associated with an auditory impression used to designate it, and by an intellectual operation this auditory impression or name is made to stand for the resultant of the impressions generally. As has been already said, this process will consist in the convergence of impressions from the various perceptive centres upon an intermediate cell-area in the superadded convolutions, where they are combined and elaborated into an idea of which the word is the symbol. This intellectual elaboration and the formation of the motor word or sound-group are two entirely different and independent processes—one is sensory education, the other motor education. A child knows the names of most of the familiar objects by which it is surrounded long before it attempts to talk, and there is no constant relation between the general intelligence of a child, as manifested by comprehension of what is said, and its ability to talk. The case of congenital aphasia given in this paper is a striking illustration of this fact. A word considered simply as an auditory impression, and as such produced by parrot-like imitation, and a word used as a name, that is, as the vehicle of an idea differ essentially; they will be revived in different parts of the hemispherical cortex, and an impulse for the utterance of the word will reach the corpus striatum by a different route in the two cases. The revival of the name in the higher centre may be effected by an impression arriving through the auditory perceptive centre, by the same means, in fact, by which it was originally implanted, or it may be revived through impressions, or ideas with which it has become almost indissolubly associated in the higher centre. I have up to the present been speaking of words employed as names, or of nouns substantive, which is the first use of words by the child in acquiring the faculty of language. Words other than names, such as adjectives, verbs, &c., constituting the framework of a sentence or proposition, stand on a different footing; they are not associated with and tied down by visual, tactual, and other perceptions. Their use implies a previous knowledge of words

as names, and marks a step beyond the act of naming (which is a part of what I have called sensory education, in which the supreme centres *receive* and combine or associate impressions) in the direction of propositionising and intellectual expression in which the supreme centres play an active part, and begin to transmit impulses outwards. They are not substantive intellectual symbols, but intellectual agents, instruments and products of intellect in action, not presentations impressed upon it. It is with respect to this class of words that it may be strictly said that "we think in words," for we often think in revived visual impressions not reduced to words. The convolutions concerned in their employment will be such as are the seat of the intellectual operations, the superadded convolutions. Even as regards the auditory perceptive centre, by means of which the sound-groups in the corpus striatum representing them were formed, these words are not revived as objects of consciousness, but the sound-groups are used automatically. These considerations enable us approximately to understand how names may be forgotten while the framework of a sentence is readily uttered, and even a periphrasis invented for a required name.

Words, as intellectual symbols or agents, have now been followed to the supreme centres or superadded convolutions; as motor processes they have previously been followed to the third left frontal convolution, which is supposed to select the words for the expression of an idea, and play upon the preformed word-groups in the corpora striata, as these ganglia in their turn select and play upon the nerve-nuclei and muscles for the production of movements. Where exactly the process of reasoning and propositionising or framing for expression the product of intellectual action takes place cannot be stated, probably the whole area of superadded convolutions of both hemispheres is engaged in it; nor is the route known by which propositions pass to the third left frontal gyrus for expression. Apparently the action of the hemispheres is bilateral as far as the formation of rudimentary perceptions, since the convolutions upon which sensory impressions brought by the radiating fibres impinge are connected together symmetrically by the corpus

callosum. The unilateral employment of one hemisphere in intellectual expression revealed by pathology apparently becomes possible only in the superadded convolutions, which are not bilaterally associated, and the unilateral education by which M. Broca and Dr. Moxon explain the pre-eminence of the left hemisphere in intellectual expression is a motor or rather efferent education only.

Reading and writing have been kept out of sight for the sake of clearness. It will not be difficult to apply the same line of reasoning to this form of language with the modification required by the consideration that it is engrafted upon and acquired through spoken language, and not directly as is the latter.

Resuming briefly the points with regard to words which embody the theory here advanced of language as the instrument and vehicle of thought :

1. Words, as remembered sounds, will be represented by cell-groups at the summit of the receptive side of the nervous system, which, for reasons given, is supposed to be situated in the marginal convolutions of the hemisphere.

2. From these cell-groups, when definitely formed, impressions will be transmitted to a cell-area in the superadded convolutions, to which also impressions conveying to the mind the various properties of objects indicated by the words will be transmitted ; all these impressions are associated, and the word is employed as the symbol for the resulting idea of the object.

3. Almost simultaneously motor cells in the corpus striatum are grouped for the production of articulate words under the guidance of the remembered sound in response to efforts at imitation, which are at first more or less parrot-like. The cell-groups for spoken words once formed are, however, employed almost exclusively in intellectual expression.¹

¹ The child learns to walk and talk because it sees and hears other walk and talk. The man walks in order to go from place to place ; he talks to convey ideas. In learning to walk the child gives attention to the act of walking, but the concatenation of cells and fibres by which walking becomes automatic is spinal, as is seen from locomotor ataxy. So in learning to talk, the formation

4. The receptive cell-groups for remembered sounds will be found in the marginal convolutions of the two hemispheres which are symmetrically associated by the corpus callosum, and the cell-groups for spoken sounds will be found in the two corpora striata, but the absence of commissural connection between the superadded convolutions of the two hemispheres permits of the predominant, if not exclusive, education of the left hemisphere for the verbal expression of the product of intellectual action, as has been revealed by pathology. This is an efferent process, and does not imply the exclusive use of the hemisphere in thought.

5. The outlet for intellectual expression in spoken words, which are motor acts, is necessarily in some part of the marginal convolutions in relation by fibres with the corpus striatum, and pathology has shown this point to be the left third frontal gyrus.

6. The left third frontal gyrus being the outlet for expression, the left corpus striatum necessarily takes the lead in the production of spoken words, but a way round exists probably from the left to the right third frontal gyrus by the corpus callosum, and thence to the right corpus striatum. Thus speech, though temporarily embarrassed by damage to the left corpus striatum, is recovered; whereas, if the cortex of the left third frontal convolution is damaged, or its fibres, both to corpus striatum and corpus callosum, cut through, speech, having no other outlet, is lost.

The mechanism of thought has been so far explained in the consideration of the mechanism of speech that it need not be followed in detail.

of automatic word-groups, though prompted by the growing intelligence, is effected by means of the auditory sense or perception centre.



ON THE
SURGICAL TREATMENT
OF
SUPPURATING OVARIAN CYSTS,
AND ON
PELVIC ADHESIONS IN OVARIOTOMY.

BY
TIMOTHY HOLMES, F.R.C.S.,
SURGEON TO ST. GEORGE'S HOSPITAL.

Received February 6th—Read March 12th, 1872.

Two important points, connected with the operation of ovariectomy are illustrated by the following case which I will first briefly relate :

Anna W—, æt. 46, was admitted into St. George's Hospital on May 11, 1871, with a view to the operation of ovariectomy. She was a married woman and had had children ; but latterly had not been living with her husband. The catamenia had been regular up to the date of her admission. On admission she seemed in fair general health though rather pale and thin, the pulse was regular, about the normal rate ; rather weak. She complained of want of appetite. The tumour had been noticed five years before, and had then been diagnosed as ovarian, but it had caused her little inconvenience until December

last, when it became constantly painful, she suffered much from sickness, and the appetite failed. Under medical treatment the sickness was relieved, but as the tumour still increased, she was advised to undergo operation.

On examination, there was a very large tumour fluctuating very distinctly, and apparently very movable. There was no displacement of the uterus, nor could the cyst be felt from the vagina. No solid masses or secondary cysts could be felt. The disease was thought to have begun on the left side.

It was decided to tap her before operating, and this was done, for the first time in her life, on May 22nd, the occurrence of the catamenia before their proper time having prevented paracentesis being performed sooner. Fourteen pints of a very viscid fluid, of pale greenish colour, and sp. gr. 1036 were drawn off, with great immediate relief to the patient. Her appetite quite returned, so that she could eat meat with relish. Examination of the abdomen detected hardly any remains of the tumour.

Everything tending to the belief that the tumour was of a simple nature, consisting mainly of a single cyst, it was decided to operate as soon as it had sufficiently refilled.

No adverse symptoms were noticed till June 17th, up to which date the abdomen had been gradually but slowly increasing in size. On that day she complained of pain and tension in the abdomen, without sickness.

For the next few days she remained in the same condition, complaining much of pain in the belly, chiefly in the right iliac fossa; but also of tenderness to pressure in various parts of the abdomen. The pulse was rapid and very weak, she altogether lost appetite and had an objection to taking wine. Morphia was necessary to procure sleep and diffusible stimulants were ordered. The temperature was unfortunately not observed; but there were no rigors nor any indication of general fever. Sickness came on on June 20th, and continued more or less at intervals, and chiefly after food, till the date of operation. She became remarkably emaciated. The size of the abdomen increased steadily, but by no means rapidly. The

pulse ranged about 100. Its chief character was extreme weakness, so that it was often very difficult to count it, and there was a thrill to be felt in all the large arteries of the body. A very small quantity of albumen was occasionally found in the urine. The pain in the abdomen was not constant, nor was the tenderness on pressure always complained of, though she generally felt it in the right iliac fossa. The tongue was always clean. Fluctuation was quite perceptible in the cyst, as before.

I was doubtful of the reason of this condition. The pain, especially in the right iliac fossa, made me think that low peritonitis had followed the tapping; still the absence of any general fever, and the late occurrence of sickness (from which it is to be remarked she had suffered before any treatment had been commenced), did not indicate the existence of any serious inflammation of the peritoneum. But her alarming weakness and emaciation appeared to contra-indicate any operation, so after consultation with Dr. J. Clarke and my other colleagues, who were all of that opinion, it was decided to send her down to our branch hospital at Wimbledon, and to operate there if she should recover sufficiently.

She left St. George's Hospital on June 28th, being then somewhat better and stronger, but essentially in the same condition.

On July 18th, I saw her at Wimbledon. She had improved in general health; did not keep her bed, and had a better colour. The abdomen was much larger, the tumour still moving freely from side to side. The feet were a little swollen towards evening. The pulse remained of the same weak, rapid, thrilling character. Mr. Gregory Smith reported that the urine again contained a little albumen.

In August I again saw her with a view to operate before leaving town for a summer tour, but as she was still excessively weak, and the tumour had increased only very slightly, it was decided to put it off till my return to London in October.

Accordingly on October 28th, as she seemed to have improved as much as she was likely to do, ovariectomy was performed. She had certainly gained flesh since her arrival

at Wimbledon, though her emaciation was still extreme ; but her pulse was not much improved, in fact, just before the operation, I could hardly count it. However she was herself anxious to have the operation performed, and looked forward confidently to recovery.

Mr. Haward administered ether. An incision was made about six inches in length, and was extended up to the umbilicus as it was found necessary. The omentum was found in front and closely adherent to the tumour, and presenting very large vessels which ran across the wound. Two silk ligatures were tied on this portion of the omentum, and it was divided between them. The cyst was now with great difficulty separated from the abdominal wall in front, to which it was closely adherent in all parts. Then the cyst was tapped ; the fluid which first ran out seemed to resemble that evacuated by tapping ; but soon purulent fluid was seen to be issuing, and then pure pus in very large quantity. The whole amount of fluid was not less than a gallon and a half, and of this it was estimated that about one half was pus. Having diminished the bulk of the cyst and ascertained that its upper part was free, I proceeded to separate the right and lower part from the omentum, to which it was most intimately united, so that I had to peel a small part of the outside of the cyst off in detaching it ; another ligature had to be applied to the stalk of the omentum. Imbedded in the omentum was a hard body in shape and size something like the uterus, but perfectly movable, and probably only a piece of thickened omentum. The tumour adhered behind to the small intestines for some inches. After separating all these adhesions, during which much care was required on the part of Mr. Pollock and Mr. Pick, who assisted me, to prevent the escape of any of the pus into the abdomen, I tried to deliver the cyst : but I found the lower portion of it so intimately united to the circumference of the brim of the pelvis on the left side, that to have torn away those adhesions would obviously have involved the greatest risk to the iliac vessels and bladder. Accordingly the remains of the cyst were pulled out as far as could be done, the intestines returned into the belly, and

the lower portion of the cyst clamped. I had by me a set of Mr. Wells's clamps, but none of them were large enough. However, a large calliper clamp (Mr. Hutchinson's) just embraced the neck of the cyst at its point of exit from the abdominal wall, and it was applied to it as firmly as possible. The wound was then united with seven or eight harelip pins, two of them being passed through the cyst below the clamp. The whole proceeding lasted three quarters of an hour; little blood was lost. She suffered nothing from sickness either during or after the operation; the ether seemed to act remarkably well.

She slept comfortably with two subcutaneous injections of gr. $\frac{1}{4}$ of acetate of morphia; and took nothing except a little ice to suck. Next morning she was free from pain, the abdomen quite flaccid; the pulse ninety-six, very weak. There was a little oozing of blood from the walls of the cyst, which were nearly half an inch thick. So I passed a strong ligature through the mass above the clamp and seared the exposed edges of the cyst well with the actual cautery. On October 30th, I removed the clamp with difficulty on account of its being so buried in the mass. She was going on well. Her pulse was 96, stronger, tongue clean, no sickness. She had passed water naturally and had taken a little fluid nourishment, with a small quantity of wine.

On the following day the bowels were open without medicine, there was a little sickness after food; the sloughing stump was covered with a charcoal poultice.

On November 1st I removed all the harelip pins and supported the wound with strapping. One of the pins passing through the remains of the cyst required some force for its removal; a quantity of very foetid oily looking serum followed it. The symptoms remained much the same. The belly was slightly swollen, but not tender. The upper part of the wound had united kindly.

Next day, the tympanitis had increased, causing the sloughing stump to recede, as it were, into the bottom of a deep pit formed by the abdominal parietes. She suffered for a few days from sickness after food, especially if she tried to take

anything solid; but this sickness seemed due to the offensive smell from the sloughing cyst, as it subsided when this had come away. This process occupied about a fortnight. The tracks of the two lowest harelip pins also sloughed. The ligatures came away about November 7th, and from this time the wound began to granulate healthily and contract.

When seen on November 19th she was still in bed, but quite convalescent, the pulse much improved in power and volume; the aspect far more healthy, the appetite quite good, and she seemed to be rather less emaciated. On examining the wound there was still seen a deep pit from the bottom of which a rather copious discharge of pus welled up; but this did not appear to come from the inside of the abdomen, for pressure in either iliac fossa did not increase it, and discovered no remains of the tumour.

She left her bed on November 27th, being convalescent in all respects except that the wound, though much contracted, had not healed.

Soon after this she returned home. When seen on January 19th 1872, the wound appeared soundly healed. No tumour could be detected in either iliac fossa, nor from the vagina. She had regained her flesh and strength and was in perfect health in every respect.

Remarks.—Suppuration in the interior of an ovarian cyst appears not to be a very uncommon event, but it has hitherto received little attention from surgeons, nor does it seem at present at all settled whether chronic suppuration can be accurately diagnosed, and, if so, what its value would be as an indication for practice.

The internal inflammation which leads to suppuration will, I should suppose, usually if not always be accompanied by external peritoneal inflammation. The first question we have to decide is whether it is possible to distinguish the symptoms of suppuration from those of peritonitis. When occurring in the acute form after the operation of tapping, I believe the diagnosis may be made with moderate certainty, from the rapid refilling of the cyst, with rigors, sweats, high

temperature and general fever. But few such cases would, I imagine, afford any opportunity for surgical treatment.¹

It is more important in a surgical point of view to inquire into the symptoms and treatment of that chronic form of suppuration which is more common and more tractable than the former. On this point I do not get much information from published works. I will quote two of the most esteemed authors on ovarian diseases.

Boinet ('*Traité pratique des Maladies des Ovaires*') makes repeated mention of the occurrence of suppuration in ovarian cysts, as in the following passage:—"Sometimes as the result of a spontaneous process, at others as the consequence of surgical proceedings, the cyst is found full of pus, which in some cases is creamy and of good composition, but more frequently serous, viscid, sanious, mixed with blood or with grumous matter, or coagula more or less altered (p. 114; see also pp. 81—96), and he relates (p. 102) an interesting case in which a dermoid cyst of the ovary, in a girl aged 20, suppurated after paracentesis. The case was treated by repeated iodine injections with benefit, but the suppuration persisted during several years of treatment, being, perhaps, kept up by the hairs and other matters contained in the cyst. In this case M. Boinet merely says that the occurrence of suppuration was preceded by several "signs of inflammation," nor in any passage, as far as I have seen, does he specify exactly any symptoms as peculiar to suppuration.

Sir J. Simpson speaks thus on the subject:—"Pus is very often a result of inflammation of an ovarian cyst, more particularly if the inflammation has been subacute rather than acute in its type. The purulent matter is usually not seen on tapping or dissection till the very lowest part of the cyst is emptied." (Works, edited by Dr. Watt Black, vol. i, p. 777). "It is rarely that you find inflammation taking place in the interior of an ovarian cyst until some operation has been undertaken for

¹ One very interesting example, however, of successful ovariectomy in a case of acute suppuration has just been recorded by Mr. Spencer Wells in a lecture in the '*Med. Times and Gazette*,' which I read since writing the above.

the cure of the disease. Yet even in cysts which are tapped for the first time we sometimes find the fluid that escapes turbid from the admixture of matters evidently of inflammatory origin; and if the patient's history be inquired into we can usually make out that at one period or another, from the time when she first noticed the tumour, she had occasional shiverings and pain in the abdomen, and that sometimes also she had suffered from profuse perspirations. Most frequently all symptoms of inflammation occurring in the interior of an unruptured and unopened cyst pass unnoticed, and when patients come to you with cystic ovarian umours, complaining of pain and other symptoms of inflammation in the tumour, you will usually be justified in concluding that the morbid process is taking place, not in the interior of any cyst, but on the external peritoneal surface of the growth." ('Clinical Lectures,' Philadelphia, 1863, p. 40.)

In a letter which Mr. Spencer Wells has been so kind as to write me on this subject he mentioned that he has removed suppurating cysts occasionally, and two such cases are shortly referred to in his papers in the 'Transactions' of this Society, vol. 1, p. 546 (No. 159, died in twenty-five hours from pyæmic fever), and p. 548 (No. 5, cyst partially removed; died fourteen hours; exhaustion).

Mr. Wells says further that the symptoms of this state of things are "pretty clear, the most important being high temperature. It often rises at night to 104° or 105° , and is seldom below 100° in the morning; pulse rapid and feeble; skin hot and dry; urine scanty, often containing albumen; tongue dry and brown; with rapid emaciation. The physical signs are those of fluid alone or of a mixture of air and fluid in the cyst."¹

I much regret that the thermometer was not used in the

¹ In a case of spontaneous suppuration related by Mr. Bryant (*loc. infra cit.*), he gives the symptoms of suppuration thus: "Anything like pressure upon it (the tumour) caused pain, and even the gentlest manipulation distress. The general appearance of the woman was very unsatisfactory. Her complexion was sallow and unhealthy; skin hot, and at times bathed in perspiration;

case I have related, but the heat and dryness of the skin was certainly not present, nor was the tongue of the character described by Mr. Wells. In fact, the patient was so free from any indication of general fever that it never occurred to me to take thermometrical observations, nor is it likely that a very elevated temperature could have coexisted with symptoms otherwise so ill-defined. The sickness which came on shortly after the abdominal pain and tenderness was of no value as a diagnostic sign, since equally troublesome sickness existed before the tumour had been meddled with in any way, and when the fluid was certainly not purulent. No rigors were observed at the time, and on questioning the patient afterwards she said she had never had any.

There remains the rapid and extreme emaciation combined with a peculiarly feeble pulse. It is difficult to convey in words an idea of the strange oppressed pulse in this patient; it really seems to me that this emaciation and this peculiar pulse were the only general symptoms which ought to have attracted our observation and on which a diagnosis could in future be founded. But I would also call attention to the fact of the patient having complained of acute tenderness when the cyst was pressed upon in various parts. We were rather inclined to doubt the reality of this tenderness, and to believe that it was merely nervous, so little did she seem to suffer in other respects and so various were the parts in which it was manifested, but it constantly excited notice, and, to me, rather added to the obscurity of the case.

Looking back on the matter with the information derived from the operation, I think I might say that in another case in which this general tenderness to pressure coincided with symptoms of low peritonitis, with rapid emaciation otherwise unaccounted for, and with a very feeble and somewhat rapid pulse, I should be disposed to conjecture the occurrence of chronic suppuration within the cyst, and that this conjecture would be confirmed if the rise of temperature mentioned by pulse 120, small, feeble, and rapid; tongue furred; appetite bad. Upon the whole it appeared as if the tumour was undergoing some degenerative change; consequently ovariectomy was postponed."

Mr. Wells were observed. Under such circumstances the temperature should, no doubt, be carefully noted.

Allowing that suppuration, whether acute or chronic, is diagnosed, what is the surgical indication? The only place in which I have as yet seen this question specifically discussed is in an interesting paper by Mr. Bryant, in the 'Guy's Hospital Reports' for 1868 (3rd series, vol. xiv), where two cases of chronic suppuration of ovarian cysts are related. In one of these Mr. Bryant laid open the cyst through a free abdominal incision. Seven or eight pints of purulent fluid with broken-up tissue were let out and the cyst carefully secured to the abdominal wall. The patient ultimately recovered, but with a sinus which continued to discharge for the period she was under observation—more than two years. In the second case another operator attempted to perform ovariectomy, but without success, on account of the extensive adhesions. "The fluid portion of the tumour was drawn off, the septa broken down, and the wound closed. In this instance most formidable complications ensued from the bursting of the pus through the wound, whereby the abdominal cavity was laid open by two apertures, each the size of half-a-crown, through each of which folds of intestine could be seen covered with adhesions, and a considerable quantity of matter was pressed up from amongst the intestines several times a day." Notwithstanding all this, the patient recovered, the wound healed completely, and she was known to be quite well four years after the operation. Mr. Bryant, however, severely blames the attempt to perform ovariectomy in this case; indeed, the obvious inference from his paper is that he regards suppurating ovarian cysts as best treated by the practice which he followed in the first case, if, indeed, it be not the only justifiable measure. On the other hand, in a most interesting lecture by Mr. Spencer Wells in the 'Medical Times and Gazette,' January 27th, 1872, he relates three cases in which suppurating cysts have been removed with the greatest advantage to the patient, and I cannot doubt that the best course to pursue is at least to attempt the operation. The question of opening the cyst freely and attaching

it to the abdominal wall in case the adhesions are found invincible must be kept before the surgeon's mind.

Another interesting question in ovariectomy, illustrated by this case, is how to manage cysts which are so adherent in the pelvis that they cannot be pulled out without too much danger. In this instance any persistent attempt to have dissected, or torn the mass away from the pelvic outlet would probably have ended in laceration of the ureters or great veins, and might after all have been futile. The alternatives are to pull the cyst as far as possible out of the abdomen and apply a clamp to its neck; or, to apply a clamp temporarily, cut away the cyst, sear the cut edges with the cautery and return the mass into the abdomen; or instead of the cautery to use ligatures for the purpose of restraining hæmorrhage from the cut edges of the cyst; or finally to stitch the edges of the cyst to the wound in the abdomen and leave the cavity of the cyst exposed.

I have no doubt of the superiority of the first method, when it is practicable, that is, when the neck of the cyst is thin enough to be embraced in the clamp. The internal surface of the cyst is thus brought into contact and may adhere and obliterate the cavity, as seems to have occurred in our patient. If this does not take place, at any rate the resulting inflammation, during the healing of the wound, will probably exclude the mass from the peritoneal cavity, just as effectually as if the edges were stitched to the wound; whilst the plan is free from the dangers incurred by leaving the remains of a suppurating cyst free in the pelvis, and those resulting from the irritation of ligatures in the pelvic cavity. Mr. Wells narrated a case of this kind in which the continued presence of the ligatures set up abscess which burst into the rectum and produced fæcal fistula.¹

The case before us was an example of complete, and, I must allow, unexpected success. I expected that when the clamp and pins had been removed, a suppurating sinus would be left proceeding from the interior of the cyst, which would

¹ 'Diseases of the Ovary,' vol. i, p. 220. 'Glasgow Medical Journ.,' February, 1868, p. 381.

only gradually dry up, if at all. Such a result, however, would not be inconsistent with good health and activity. But as three months have passed away since the operation,* and the cicatrix is quite sound and free from irritation, with no perceptible swelling beneath it, I hope I am justified in regarding my patient's recovery as permanent.

* This patient has now (Oct., 1872) been under observation nearly a year and remains well.

AN ACCOUNT OF A CASE
OF
RESECTION OF THE SHOULDER AND
ELBOW JOINTS OF THE SAME ARM
FOR
GUNSHOT INJURY.

BY
WILLIAM MAC CORMAC, F.R.C.S.,
ASSISTANT SURGEON TO ST. THOMAS'S HOSPITAL.

Received February 17th—Read March 12th, 1872.

I AM not aware that it has before happened to any surgeon to have to remove during the course of one operation the two principal joints of the upper extremity.

Some particulars of the case I am about to describe have already been made public, but since the ultimate usefulness of the limb under such circumstances must prove the chief question of interest, I trust I shall not trespass on the attention of the Society if, at the expiration of nearly eighteen months, I narrate what the issue has been.

Louis St. Aubin belonged to a French corps d'élite, the 3rd Chasseurs d'Afrique. During the early part of the day on which the Battle of Sedan was fought his horse was shot under him in a cavalry charge, and while struggling on

foot he received a severe bayonet wound in the face, the only instance of the kind I observed amongst a large number of wounded. He then got separated from his comrades. But although wounded St. Aubin was anxious for more fighting, and later in the day joined a party of marines for the purpose of engaging the enemy. But it was no long time before he became completely disabled by a shell explosion. The fragments severely lacerated the bones and soft parts of his right arm in the region of the shoulder- and the elbow-joints.

For twelve days, until September 12th, he lay without receiving any special attention, in one of the makeshift ambulances near the scene of action, and then he became my patient in the Caserne d'Asfeld, a large barrack converted into a hospital, of which I had charge in Sedan.

When I first saw the patient I found a large suppurating wound in the deltoid region, and another on the posterior aspect of the elbow-joint. The soft parts were extensively injured, and the bones much comminuted. It almost seemed as if amputation at the shoulder-joint were indispensable. I nevertheless determined, if practicable, to save the limb.

Soon after admission I proceeded to remove the injured bones. We endeavoured to make the man inhale chloroform but without avail, and the first half of the operation was completed without it. He bore it, tedious as it was, without a murmur. But to save needless suffering we constrained him to inhale chloroform before removing the other joint.

For both joints the original wounds afforded by their position facilities for utilising them, and I merely extended the wound upward and downward in the straight line.

The shoulder-joint was first excised. Four inches of the upper extremity of the humerus were removed, the bone being sawn through at the limit of the fractured portion.

The specimen shows the extent to which the bone was injured.

The elbow-joint was next carefully examined. Only the external condyle of the humerus was implicated, and only the thinnest possible slice was removed by the saw. The ulna

was extensively fractured, the olecranon process pulverised, and the shaft split throughout its upper third. The fragments were removed subperiostially, and the irregular extremity of the shaft cut through at the junction of the middle and upper third. A further portion of shaft split off for an inch further down the posterior surface was also removed, so that the divided extremity of the ulna only presented about two thirds of the section of the bone. As the radius was not implicated beyond its articulating head, this only was removed. The bones of the forearm were therefore divided at very different levels, but the tubercle of the radius was preserved with the muscular attachments belonging to it, and I trusted to the preserved periosteum to regenerate in part the portions of ulna removed. To have sawn off both bones at the lower level would most certainly have precluded all hope of a useful result. The sequel shows, I think, the propriety of this proceeding.

The after-treatment consisted in supporting the injured arm on pillows, and providing for the free outflow of matter.

Neither in this nor any other case of resection of elbow- or shoulder-joint did I employ splints, and from choice I always employed a single straight incision in the soft parts.

Until September 23rd, a week subsequent to the operation, the patient progressed well. Then his temperature rose, the skin and conjunctivæ became yellow; he had rigors, sweating, and delirium. I gave him up for lost, as I had been obliged to give up so many other operation cases from a similar cause; but he rallied contrary to our expectations. An abscess formed deep in the neck. On being opened it gave exit to a quantity of foetid pus. The wound now began to improve in appearance, and the patient regained appetite and strength. He never lost pluck and would often exclaim, "J'ai du courage moi, j'en guerirai."

After I left Sedan St. Aubin remained under the care of Dr. Duplessy in the Military Hospital. Subsequently he was sent to Constantine in Algeria, whence he wrote to me he was sorry he was not well enough to carry arms against the Arabs, at that time in revolt. The condition of his arm was, how-

ever, steadily improving. The elbow had healed, and so had the shoulder, save a sinus leading to some necrosed piece of bone. I caused him to come over to London, partly in order to remove this sequestrum, and partly to better observe his actual condition. I proposed extracting the piece of dead bone and then presenting the patient for the inspection of the members of the Society, but an attack of home-sickness caused him to take an abrupt leave of us and return to France.

I can therefore only present to you a photograph, recently taken, and give you the description of the man's actual present condition.

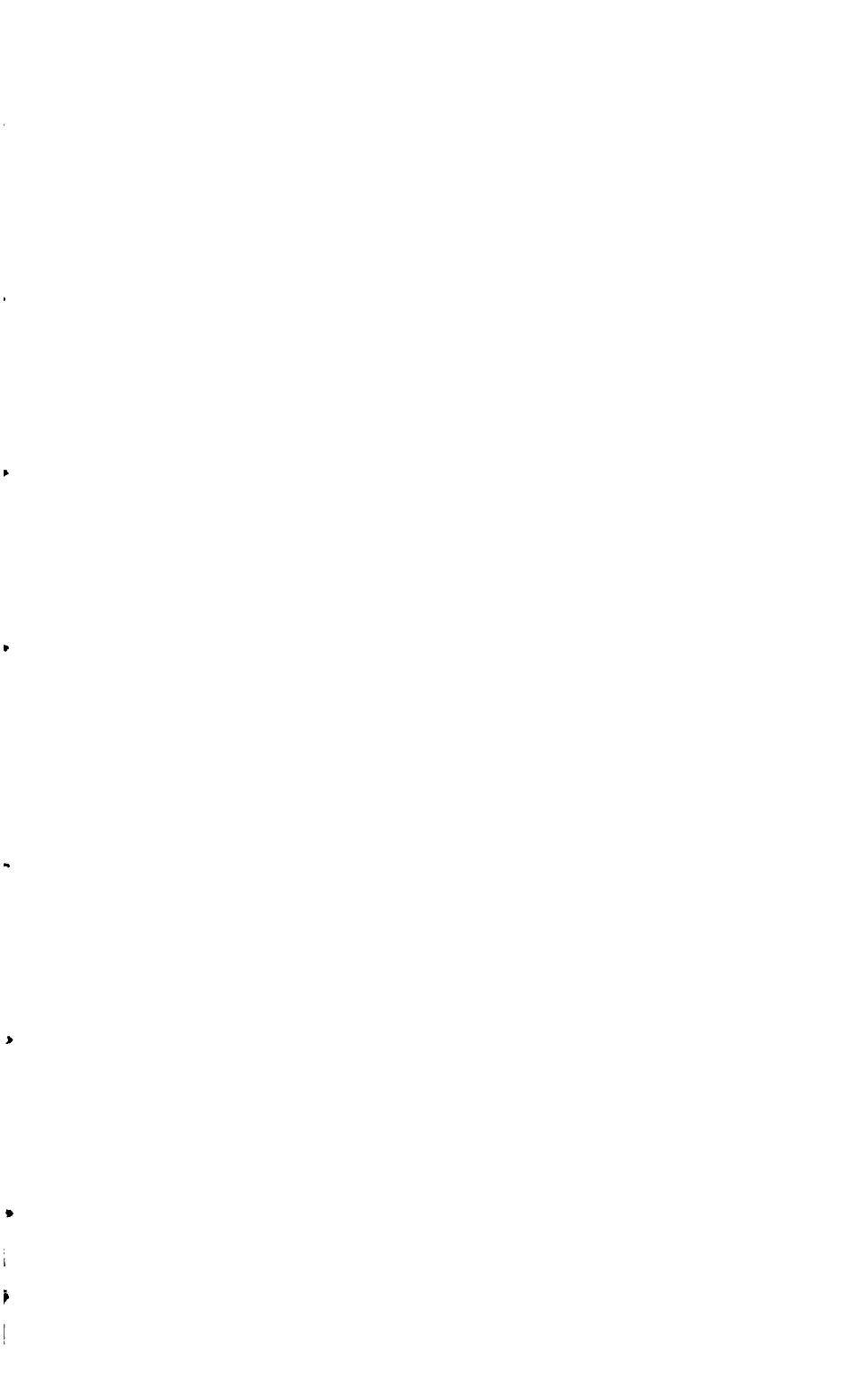
The elbow-joint is thoroughly healed, and the ulna so far reproduced that there is scarcely any appreciable deformity or loss of shape in the joint. He can flex and extend it, and also pronate and supinate the forearm. The power of the hand is being rapidly and completely regained. As the shoulder-joint is not yet healed its condition is not so satisfactory, but by means of the pectoralis and latissimus dorsi muscles he moves the joint freely backward and forward. He cannot raise the arm very high from the side, but this is no uncommon result after excision of this articulation, and in this particular instance the greater portion of the deltoid muscle was destroyed by the shell fragment causing the original wound.

I can entertain no doubt that as soon as the necrosed piece of humerus is removed the sinus in the region of the shoulder will close, and the usefulness and power of the limb become greatly increased. Meanwhile I submit that the man's present condition is extremely satisfactory, and while it affords an ample justification of the operation as performed, it also warrants me in placing this case upon record as one of successful resection for gunshot injury of the elbow- and shoulder-joints of the same arm.



DESCRIPTION OF PLATE I.

The illustration, copied from a photograph taken about sixteen months after the injury, serves to show the appearance of the arm after the resection of its two principal joints. The satisfactory condition of the elbow-joint is well seen in the plate. The sinus leading to a piece of necrosed bone in the humerus is noticeable in front. The man is otherwise well nourished, and completely convalescent save for the piece of necrosed humerus, which has doubtless ere this been removed.







ON
A CASE
OF
ABDOMINAL ANEURISM
CURED BY
COMPRESSION OF THE AORTA.

BY
WALTER MOXON, M.D.,
ASSISTANT PHYSICIAN TO, AND LECTURER ON MORBID ANATOMY AT,
GUY'S HOSPITAL;
AND
ARTHUR E. DURHAM, F.R.C.S.,
SURGEON TO, AND LECTURER ON ANATOMY AT, GUY'S HOSPITAL.

Received April 2nd—Read April 9th, 1873.

THERE are comparatively few maladies recognisable during life which are less amenable to treatment, and more certainly fatal in result, than aneurisms of the aorta, and its primary or visceral branches.

We therefore venture to think that the following details of a case in which we have recently succeeded in curing an abdominal aneurism by compression of the aorta are sufficiently interesting and important to merit the attention of the Fellows of the Royal Medical and Chirurgical Society; and the more so because, so far as we have been able to ascertain, this is the second case only of the kind in which a similar method of treatment has been followed by similarly successful results.

The first case occurred in the practice of Dr. Murray of Newcastle-upon-Tyne, to whom is due all the credit of having initiated the method of treatment we have adopted. The particulars of Dr. Murray's case were communicated to this Society by the late Mr. Charles Moore on the 24th May, 1864. Six years subsequently to the cure of the aneurism the patient died; and the case was rendered complete by a careful post-mortem examination, the details of which have been published by Dr. Murray in an interesting and able, though brief essay on 'The Rapid Cure of Aneurism by Pressure.'¹

The patient whose history we have now to narrate presented himself among Mr. Durham's out-patients at Guy's Hospital on the 2nd August, 1871. He was a comparatively healthy-looking young man, twenty-seven years of age, single, and a plasterer by trade. He had been accustomed to drink hard, but so far as could be ascertained had never suffered from syphilis. In his daily work he had been in the habit of frequently stooping and raising himself more or less suddenly, and sometimes under considerable strain. Six months previously he had begun to suffer from aching pains about the lower dorsal region occasionally extending round the abdomen. Pains were also felt down the front of the left thigh and leg. These pains gradually increased in severity, and becoming more or less constant prevented him from sleeping at night. After a time he noticed a "pulsation" in his abdomen.

On examination, the existence of an abdominal aneurism of considerable size was at once recognised. The pulsation and swelling were manifest to the eye as well as to the touch.

The patient was recommended for immediate admission to the hospital, and was placed under the care of Dr. Moxon in the Clinical Ward.

On subsequent and more careful examination it was found that the aneurism could be distinctly felt over a space extending from rather less than an inch below the cartilages of

¹ 'The Rapid Cure of Aneurism by Pressure,' illustrated by the case of Mark Wilson, who was cured of Aneurism of the Abdominal Aorta in the year 1864. By William Murray, M.D. J. & A. Churchill, London, 1871.

the false ribs to the level of the umbilicus, and from the right of the median line to about midway between the median line and the left border of the abdomen, or rather further. The aneurism pulsated strongly, but the pulsation could be controlled and even entirely arrested by deep digital pressure. There was no tenderness of the surrounding parts; but much manipulative examination gave rise to considerable pain.

The patient was kept in bed and perfectly at rest for eleven days. Very sparing diet only was allowed; and pills of acetate of lead and opium were administered every six hours with the view of diminishing the desire for food.

On the morning of the 14th August, the patient having fasted since the previous evening, chloroform was administered, and Mr. Durham proceeded to compress the aorta above the aneurism by means of what is known as Lister's abdominal tourniquet.¹

By positioning the body of the patient just sufficient space was afforded for the introduction of the pad of the tourniquet between the cartilages of the ribs and the aneurism. The tourniquet was adjusted and screwed down *very slowly* until the pulsation of the aneurism was completely arrested; but the greatest care was taken to exert no more pressure than was absolutely requisite. The pulsation of both femoral arteries was of course also entirely arrested. In order to guard as far as possible against any ill effects from the suspension of the supply of blood, the lower extremities were enveloped in cotton wool and flannel, and hot water bottles were placed in the bed.

The patient was kept under the influence of chloroform, and the pressure was absolutely maintained, for ten hours and a half. At the end of that period the general condition, as indicated by the pulse and respiration, was such as seemed to render it desirable to discontinue the treatment.

On removing the tourniquet it was found that the aneurism no longer pulsated. It was manifestly smaller and harder than before the application of the pressure. The

¹ The merit of inventing and first applying this instrument is due to the American surgeon Pancoast.

surface of the skin upon which the pad of the tourniquet had pressed was of a bright red colour. No pulsation of either femoral artery could be detected. The lower extremities when uncovered and exposed for examination were found to be cold and clammy to the touch, and presented here and there irregular livid or palish purple patches of discoloration. It is worthy of note, however, that at the end of the treatment the extremities appeared less cold, and the patches of discoloration were fewer and smaller than they had been found to be when examined during the progress of the compression at a comparatively early period.

In the course of a short time pulsation of the aneurism was again distinctly recognised. But it was very much feebler and altogether different in character to the strong full pulsation which was so manifest before the commencement of the treatment.

A little nourishment and stimulus and a full dose of opium were administered. After this the patient slept, and passed a comfortable night.

The next day the aneurism was smaller, much harder, and less compressible than it had been. But it still pulsated in a marked degree. Pulsation of the femorals was scarcely if at all perceptible. The right foot was cold, the left of almost normal temperature. Sensations of tingling and slight numbness were experienced by the patient; but sensibility to touch was almost re-established. The portion of skin which had been immediately in contact with the pad of the tourniquet presented a bruised appearance. It was of a deep livid red colour, and was exquisitely tender to the touch. The patient suffered from no *internal* pain or tenderness whatever, nor could any indication be detected of visceral disturbance or mischief as the result of the long-continued and severe pressure. During the early part of the night there had been some slight retching and vomiting; but these symptoms ceased altogether before morning and did not recur. The only obvious ill effects of the prolonged administration of chloroform that remained was some slight degree of inflammation of the conjunctivæ. This probably was accidental;

at any rate it very soon subsided. During the day the patient continued in every respect far more comfortable than might have been expected. Indeed it seemed somewhat strange that such severe treatment should have been followed by such marked absence alike of local suffering and general constitutional disturbance. The patient was disposed to sleep. This, however, was doubtless owing to the effects of opium which was administered at intervals in small doses. The pulse was weak, and varied in frequency from 100 to 110.

The day following the local and general conditions remained much the same. But it was especially noted that though the pulsation of the right femoral artery had become more distinctly perceptible than that of the left, yet the right foot was manifestly colder than the left, and the patient experienced a much more marked sense of tingling and numbness in the right than in the left foot.

Tincture of the perchloride of iron and tincture of digitalis, of each ten minims, were ordered to be taken every three hours.

It would be tedious, and is altogether unnecessary, to continue the daily report of the case. No bad symptom of any kind arose; but the pulsation of the femorals which had returned to some slight extent soon ceased altogether to be perceptible. The condition of the aneurism varied somewhat from day to day. The pulsation was sometimes more, sometimes less distinctly felt; but it was manifest that good and certain progress was being made.

At the end of a fortnight the aneurism was not only much smaller, and harder, and feebler in pulsation, but such pulsation as remained could be arrested with great ease by digital pressure upon the aorta. This being the case the question was raised as to whether it would not be well to apply the tourniquet again, or to keep up digital pressure for some short time, in order to complete the cure with as little delay as possible. On consideration, however, we decided that it would be better to avoid incurring the risk (slight though it might be) involved in any repetition of severe measures, and

to wait, at any rate, until more time had been allowed for the setting and organisation of the clot in the interior of the aneurismal sac, and the induration and contraction of the surrounding tissues. It cannot be doubted that these are essential elements in the process of cure of an aneurism, nor that they require a more or less considerable period of time for their full development and working.

The result justified our decision in favour of delay. The aneurism became more and more consolidated, and gradually diminished in size. The pulsation became less and less easily recognisable, until rather more than a month after the application of the pressure, when it ceased altogether to be perceptible. During the whole of this period and for some weeks subsequently the patient was kept absolutely in bed. His only complaint was of tingling and sensations of coldness and numbness about the lower extremities, and especially about the right foot. These symptoms varied greatly in intensity from time to time, but they gradually became less and less troublesome. There still remains, however, some degree of discomfort about the right foot. The limbs were kept well wrapped up, and manual friction was regularly employed to favour the restoration of the circulation.

During the last three or four months the patient has been up and walking about and freely taking moderate exercise. He has not yet been permitted to return to work, nor would it appear desirable that he should resume for some time to come his former laborious occupation. His general health has been good throughout, far better indeed than it had been for many months previous to his admission to the hospital.

He is presented for examination to-night.

It will be found that the remains of the aneurismal tumour can be distinctly felt. So far as we are able to judge this tumour does not pulsate at all; but a certain impulse is communicated to it by the portion of the aorta which remains pervious.

Occasionally of late we have thought we could detect slight pulsation of one or other femoral artery, but at other times no trace of such pulsation has been perceived.

The anastomosing vessels by which the collateral circulation is carried on cannot at present be distinctly made out. It is probable therefore that the deeper vessels are still principally employed; and that those superficial branches which commonly play so important a part in maintaining the circulation after obstruction of the main trunks of the lower part of the body, have not as yet become fully enlarged.

Slight traces of the effects of the pressure on the skin may still be seen. They serve to mark the spot upon which the pad of the tourniquet was applied.

Remarks.—The case thus recorded, especially if considered in conjunction with the similar case already alluded to as published by Dr. Murray, appears to us to prove beyond probability of dispute—

First, that in some instances, at any rate, it is practicable to apply mechanical pressure to the upper part of the abdominal aorta to such an extent as to completely arrest the onward flow of blood, and at the same time in such a manner as to inflict no serious injury whatever on the visceral or other structures.

And, secondly, that in certain cases, under favorable conditions and circumstances, mechanical compression of the abdominal aorta may be safely continued during a period sufficiently long to permit such changes to take place in the contents of an aneurismal sac, and in the course of the circulation generally, as may lead to the speedy or ultimate cure of the malady, even though some part of the aorta itself, or one or other of its large primary branches, may have been affected.

We therefore have no hesitation in expressing our opinion that in cases of abdominal aneurism, in which the application of the method appears practicable, careful attempts should be made to compress the aorta on the proximal side of the aneurism.

It must be at once admitted that cases in which this method is applicable are comparatively rare. Nevertheless they do occur from time to time; and indeed we have at the present time under our care in Guy's Hospital a second

case in which we intend to carry out the same line of treatment we have found so successful in our first.

By far the largest proportion of abdominal aneurisms occur at or about the origin of the coeliac axis, or in connection with this trunk or one of its branches.¹ Now in any such case it would in all probability be absolutely impossible to apply pressure on the proximal side of the aneurism.

But, although of much less frequent occurrence, aneurisms of the aorta about the origin of the inferior mesenteric artery as well as of the inferior mesenteric itself are occasionally met with. In the case published by Dr. Murray the aneurism which had been cured was proved on post-mortem examination to have occupied the lower part of the aorta and to have involved the origin of the inferior mesenteric; and in the case which forms the subject of our present communication there appears reason to believe that the aneurism was similarly situated and connected.

In any such case, provided it is undertaken before the aneurism has attained too large a size, it is probable that room may be found for the application of the pad of the tourniquet between the cartilages of the ribs and the aneurism. As the tourniquet is screwed down the pad will pass to some extent, as it were, under cover of the rib cartilages, and even apparently round the border of the aneurism.

With regard to aneurisms occurring about the middle of the abdominal aorta, or in connection with the origin or trunk of the superior mesenteric artery, it is difficult to form any *à priori* opinion as to the probability of their admitting of the method of treatment under discussion. We may say, however, that we believe that in the case to which we have referred as being at present under our care, the aneurism is connected with the superior mesenteric artery. Though not so large, it is decidedly higher up in the abdomen than the aneurism in our first case; and further, it is capable of being moved bodily across from the left to the right side of the

¹ Such is stated by Dr. Sibson to have been the case in no fewer than 131 out of 177 instances of abdominal aneurism analysed by him. 'Medical Anatomy,' by F. Sibson, M.D., F.R.S., pp. 57, 58.

median line. In this case Mr. Durham succeeded on two occasions last week in experimentally arresting all pulsation of the aneurism by digital compression of the aorta. Yesterday, however, he found it impossible to apply the tourniquet in such way as to stop the pulsation of the aneurism without employing more force than he deemed safe. Pulsation of the femorals was arrested without difficulty, but that of the aneurism, although considerably reduced, continued in spite of all efforts, too strong to encourage any hope of a successful result. The attempt, therefore, was for the time being abandoned, but only to be renewed on an early future occasion. It may be considered worthy of note that three several times when the tourniquet was being screwed down the aneurism slipped across the median line to the right side. It was, however, each time easily replaced on relaxing the pressure. During the progress of the attempts that were made a number of sphygmographic tracings of the pulse at the wrist were taken by Mr. Mahomed (see Plate II). These afford striking and interesting illustrations of some of the effects upon the general circulation produced by compression of the upper part of the abdominal aorta, or the parts in immediate relation with it. Every time the tourniquet was screwed down to such an extent as to arrest the pulsation of the femorals the character and frequency of the pulse at the wrist was affected in a very remarkable manner; and every time the pressure was relaxed the pulse very speedily retained its previous condition. These changes in the character and frequency of the pulse at the wrist followed the application and relaxation of the pressure almost instantaneously, and with the utmost constancy. It may be an interesting question to determine how far the effects alluded to and illustrated by the sphygmograms were dependent simply upon the mechanical disarrangement of the circulation, and the consequent increased strain upon the aorta valves, and how far on the other hand they may be considered to have been due to physiological disorder of the heart's action, resulting from some possible, and not improbable pressure upon the great sympathetic nervous centres of the abdomen.

In conclusion, we would only add that we have refrained from offering any opinion or entering upon any discussion as to the practicability and prospects of success of any attempts to cure abdominal aneurisms by compression of the aorta on the distal side. We have thus refrained because it appears to us scarcely likely that any question of comparison between the two methods can be raised in reference to any particular case. As a general if not invariable rule it will be found that those cases in which proximal pressure is applicable, present such conditions as must render distal pressure difficult or impossible; and the converse is probably almost equally true. We may, however, remark that if the theory of the process of cure by distal pressure be correct, then it would appear obvious on anatomical grounds that the cases of abdominal aneurism in which this method is likely to prove successful must be very rare indeed. The branches of the abdominal aorta are so numerous, so large, and come off so close together, as to leave little chance of compressing the main trunk below any possible aneurism in such manner as to fulfil the conditions supposed on theoretic grounds to be requisite.

DESCRIPTION OF PLATE II.

[For the sphygmographic tracings copied in the accompanying Plate, as well as for the substance of the following explanatory notes and description, we are indebted to our friend, and recent pupil, Mr. F. A. Mahomed, at present Assistant Medical Officer to the Highgate Infirmary.]

Figs. 1 and 2 represent tracings produced by the right and left radial arteries respectively, when the patient was seen in his ordinary condition. Both were taken with the same degree of pressure (viz. 3 oz.) applied to the radials, but marked differences exist between them. The right (Fig. 1) presents all the appearances produced by an ordinary normal pulse. But the left (Fig. 2) shows a more marked "percussion wave," and the distension of the artery by the "tidal wave" is more prolonged than usual. These differences may possibly be due to the comparative proximity of the source of origin of the left radial to the aneurism, which may probably have somewhat obstructed the blood flow.

The following figures all represent tracings produced by the right radial at different periods during the progress of the attempts made to compress the abdominal aorta to such extent as to obstruct completely the flow of blood through it, and to arrest the pulsation of the aneurism; and all were taken under the same pressure to the radial (viz. 3 oz.) except Figs. 3 and 4, in which a pressure of 4 oz. was applied.

Fig. 3 represents the tracing obtained when the patient was fully under the influence of chloroform, but before any pressure was applied to the aorta. Its character corresponds with that shown in Fig. 1, the slight differences depending almost entirely upon the different pressure (a difference of 1 oz.) applied to the radial.

Fig. 4 shows the change in the character of the pulse at the wrist, which immediately followed the screwing down of the tourniquet so as to compress the abdominal aorta. The pulse, as thus represented, had become at once smaller, quicker, and dicrotic. The increased rapidity and the diminished fulness of the pulse may probably be attributed to the effect produced upon, and communicated through, the sympathetic nervous system either as the result of direct stimulation of the semilunar ganglia by the pressure, or as some reflex effort to overcome the obstruction to the circulation.

PLATE II (continued).

The dicrotism, however, which is the most striking and interesting feature presented, would appear to be the result of the increased strain upon the thoracic aorta. There being reason to believe that the dicrotic wave results from the contraction of the elastic coat of the aorta immediately after its distension by the ventricular systole, it is evident that under the conditions existing when this tracing was taken the distension of the thoracic aorta, and its corresponding contraction from elastic recoil, must have been very greatly and abnormally increased, and that, therefore, the "dicrotism" presented must be, as shown, most markedly increased.

Fig. 5 represents the tracing produced immediately after the tourniquet was unscrewed and the pressure relaxed. It shows a return of the pulse to a condition more or less closely resembling that which it presented before the application of the pressure as shown in Fig. 3, the excessive dicrotism having disappeared.

Fig. 6 represents the tracing obtained when digital pressure was applied to the aorta. The dicrotism is more marked than in Fig. 4, probably because the passage of blood through the aorta was more completely obstructed.

Pressure having been relaxed, the tracing from which Fig. 7 is taken was immediately obtained. The character of the pulse as thus shown differs somewhat from that presented before the application of the compression. The tidal wave is more sustained and fuller. This difference may, perhaps, be due to slower and more powerful contractions of the heart in effort, as it were, to overcome the obstacle presented.

Fig. 8 shows the effect produced by reapplication and partial screwing down of the tourniquet.

Fig. 9 represents the tracing obtained after the removal of the tourniquet and the abandonment for the time of the attempts made. The increased force of the heart's contraction and the sustained tidal wave are plainly indicated.

NOTE.—Many tracings besides those of which copies are here given were taken during the progress of the attempts made to compress the artery; and it is worthy of especial remark that so instantaneous and so constant was the change from the non-dicrotic to the dicrotic condition of the pulse that by watching the lever of the sphygmograph alone without any knowledge of the movements of the operator it was easy to say when compression was applied to the aorta and whether it was effectual or not.

Sphygmograms.

Illustrating the Effect of Compression of the Abdominal Aorta upon the Pulse at the Wrist, in the Case of T.D. at 30 Suffering from Abdominal Aneurism.

1.



*Ordinary Conditions,
Right Radial.*

2.



*Ordinary Conditions,
Left Radial.*

3.



*After Chloroform,
Before Compression.*

4.



*Immediately after
Screwing down Tourniquet.*

5.



*No Compression,
Tourniquet removed.*

6.



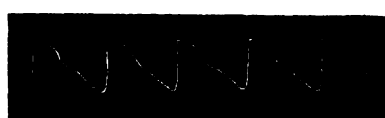
Digital Compression.

7.



No Compression.

8.



*Tourniquet again applied,
& partial Compression.*

9.



*No Compression.
Still under Chloroform.*



A CASE
OF
ABDOMINAL ANEURISM TREATED BY
DISTAL PRESSURE.

WITH REMARKS.

BY
THOMAS BRYANT, F.R.C.S.,
SURGEON TO GUY'S HOSPITAL.

Received April 2nd—Read April 9th, 1873.

ON February 17th, 1872, I was asked by Dr. Pavy to see a patient under his care in the clinical ward of Guy's Hospital, afflicted with an abdominal aneurism. The following history of the case was then read to me as reported by Messrs. E. Younger and R. J. Pye-Smith :

Thomas C—, æt. 30, was admitted into Guy's Hospital on February 9th, 1872. He had been a soldier in the 88th Foot for ten years, nine of which he had spent in India. He had left the service six years ; and since then he had been working at heavy wharf work. He had had syphilis sixteen years ago, and dysentery when in India ; but in all other respects he had been a healthy man. He had never been accustomed to take spirits.

Six months ago whilst walking, he first felt a sharp pain in the epigastrium ; it was so severe as to compel him to sit down. He kept at rest for two days, when the pain ceased, and he returned to his work ; the pain, however, rapidly

recurred and he again left off work. Since then the pain has continued to recur at shorter and shorter intervals, and with greater severity. He kept at his work with occasional intermissions up to the present time.

Four days before admission he began to have pain in the loins and testicles, especially on the left side. For the last fortnight he has been losing flesh.

On admission.—The man is a sturdy looking fellow, but seems despondent. His appetite is bad. Nothing abnormal can be made out in the chest. A pulsating and expanding tumour occupies the epigastric and left hypochondriac regions: it seems to be about the size of a fist. On auscultation a double bruit is heard over the tumour, but not in the back. Patient complains of pain in the tumour, and of occasional severe shooting pains from the left testicle and left side of the abdomen to the back. The urine is healthy. Pulse 64; respiration 20; temperature 98·9°.

When I saw him the aneurismal tumour was very marked, it was clearly so placed just beneath the diaphragm as to forbid the adoption of any treatment on its proximal side. I consequently determined to try distal pressure by means of Lister's abdominal tourniquet, keeping the patient under the influence of chloroform, feeling that no other plan of treatment was open. The bowels were, however, ordered to be freely opened before any treatment was adopted. In these suggestions Dr. Pavy readily concurred.

February 20th.—The bowels having been emptied by a turpentine enema, milder injections having failed, and a day given for rest, pressure was commenced at 2 p.m. The man was anæstheticised by Mr. C. Oldham; the tourniquet was adjusted above the umbilicus, close below the tumour, but some little difficulty was felt at first in controlling the pulsation in the two femoral arteries; after three hours the instrument was so readjusted as to control both.

At the end of six or seven hours the stomach was found to be considerably distended and the tumour was thought by the ward clerk to be slightly harder. The feet became rather cold, but there was very little venous congestion. Pressure

was continued up to 2 a.m., twelve hours in all. The tumour continued to pulsate the whole time.

21st.—The patient has been sick two or three times during the night, bringing up a little thin greenish fluid. He had passed a quiet and satisfactory night, having taken a dose of morphia. He feels no pain. He has taken scarcely any food, although cold milk was ordered. The tumour was generally thought to be harder. Pressure was recommended to be reapplied at 2 p.m., twelve hours after it had been removed.

Chloroform was again given and the instrument adjusted, the man vomiting slightly. After about three hours the breathing became unsteady and feeble. The pulse also was very weak. The feet became cold and the veins congested. The tourniquet was consequently removed after it had been on for four hours, all these symptoms having become more marked.

A subcutaneous injection of morphia was given and an enema of beef tea, but the latter was rejected.

Towards night the pulse became thready and the man was clearly sinking. He died at 5 a.m., on the 22nd, about eleven hours after the removal of the clamp, and thirty-nine hours after its first application.

On the 22nd, Dr. Moxon made a post-mortem. I give the account in his own words :—

“An aneurism the size of an orange was found to exist which included the cæliac axis and the origin of the superior mesenteric artery; it communicated with the aorta by an opening the size of a halfpenny, it was crossed by the pancreas. The sac contained on an average a layer of clot one third of an inch thick, lining its interior but not very adherent; and this clot rested below on a rounded mass of clot one inch thick: it was marked over by plexiform white lines—the edges of planes of fibrin running through it—the remains of parts which had successively been temporarily exposed to the current. (Vide drawing from prep., Plate III). The remainder of the aorta was singularly free from disease.

“The pressure was found to correspond with the bifurcation of the aorta, an ecchynosed patch existed on the peritoneum

of the abdominal parietes corresponding to the seat of the pressure ; a second in the mesocolon, a third in the mesentery with the mesenteric half of a coil of jejunum four feet from the duodenum. The duodenum and four feet of intestine above the injured bowel were thickened, œdematous and distended with fluid, whereas the bowel below was natural and empty. There had evidently been obstruction of the bowel at the injured spot.

"The peritoneum was generally injected of a deep red colour, and lymph existed along the intestinal coils, indicating a peritonitis of ten or twelve hours' standing. The tissues about the compressed aorta were loaded with effused blood."

Remarks.—The interest of this case is very great, and the lessons to be learnt from it are not without their value, for whilst in a clinical point of view it illustrates the fact that peritonitis as a consequence of contusion of the intestine or peritoneum is a danger which must be taken into account in the use of the abdominal tourniquet under all circumstances, it demonstrates the pathological fact that pressure upon the *efferent* artery of an aneurism or distal pressure, for twelve or sixteen hours, is as capable of producing the formation of a solid coagulum in a sacculated aneurism even in a large artery, as pressure upon the *afferent* vessel, or proximal pressure.

I do not propose, however, to dwell upon the first clinical fact. The danger it illustrates must be admitted ; it is one which apparently is not to be avoided ; it seems to appertain to the application of pressure by an abdominal tourniquet for any purpose ; it is an extra element of danger in its use which should always be considered.

Upon the pathological fact, however, as illustrated by the drawing from the preparation, much more may be said, for it reopens the whole question of the distal treatment of an aneurism ; and whilst demonstrating to a nicety the value of distal pressure on a large artery for a sacculated aneurism, it suggests the value of other forms of practice upon

its distal side; for if pressure for a few hours upon the efferent artery of an aneurism (sufficient to arrest the flow of blood through its channel) is enough to bring about the mechanical closure of a sacculated aneurism by means of a clot, and, consequently, its cure, surely the application of other means which are calculated to fulfil the same purpose may be employed to effect the same end.

Of these means the acupressing power, as applied by Porter ('Dublin Quart. Jour. Med.,' Nov., 1867); the temporary ligature as adopted by Hunter, Astley Cooper, Travers, and others; and, possibly, Lister's carbolised catgut ligature, appear the chief.

I would also suggest, that some instrumental means should be looked for by which the inner and middle coats of an artery may be divided and allowed to recurve as in torsion—without destroying the external coat; acting on the knowledge that an artery after a contusion may become occluded, and the fact Moore has given us, that a blow upon the common iliac artery may so detach its inner coats as to allow them to recurve and thus close the vessel.

In the instruments that have been hitherto employed for the temporary occlusion of an artery, the compressing force has been either enough to destroy all the coats of the vessel, as in the permanent ligature, or so diffused, as only to compress the vessel. Whether we have in the artery constrictor of Dr. Fleet Spiers of New York ('Medical Record,' New York, April 1, 1871) what is wanted, is an open question, but in justice I am bound to say that from repeated experiments upon vessels removed after death, it does all he states—it divides the inner and middle coats of the artery and produces their recurvation as in torsion, and in the brachial artery of a living subject after amputation, it arrested hæmorrhage as readily and effectually as torsion.

In the case before us we have a pathological proof that temporary pressure on the distal side of the aneurism is enough to bring about its cure. In Edward's case ('Lancet,' Jan. 9, 1858) the same fact is clinically illustrated upon the innominate artery.

In Porter's case, already mentioned, the treatment by distal acupressure is also encouraged.

The results, moreover, of the distal ligature for carotid aneurism as first practised by Wardrop are not unsatisfactory, four out of seven cases recovering, although as applied to other arteries less favorably situated the practice has it is true, been less favorable.

In conclusion, I would therefore respectfully submit that these facts, taken together, seem to indicate that the distal treatment of an aneurism is well worthy of renewed attention.

That this distal treatment may be carried out by means of pressure, digital or instrumental, by some acupressing power, some temporary constricting power, whether by ligature or otherwise; or by the use of some apparatus, by which the inner tissues of an artery may be lacerated and allowed to recurve, as in torsion, without the destruction of the outer. And although many of those remarks are as applicable to the treatment of an aneurism on its proximal side as on its distal, they are far more so to the latter, for it is to be remembered that a large number of aneurisms to be treated at all must be dealt with on their distal side.

Up to the present time the distal treatment of aneurism has been, with rare exceptions, judged mainly upon the results of the application of the permanent ligature. The distal treatment by pressure and other allied means has not had a fair trial. The case I have had the pleasure of bringing before you somewhat forcibly illustrates the value of distal pressure; and if it be the means of leading the minds of surgeons to reconsider the value of the distal treatment my object will have been attained; for I have a strong feeling that the distal treatment of aneurism by means of pressure in one of its forms, is likely to be followed by as much success as has already attended the treatment by pressure when applied to the proximal side of an aneurismal tumour.



DESCRIPTION OF PLATE III.

Abdominal aneurism involving the coeliac axis and origin of the superior mesenteric artery filled with coagulum after the application of pressure by means of Lister's tourniquet for twelve hours, and again for four hours after twelve hours' intermission.

The patient died from peritonitis eleven hours after the removal of the tourniquet, the peritonitis having been clearly the consequence of contusion of the peritoneum and intestine by the pressure of the instrument. The preparation was taken from Thomas C—, æt. 30, a patient of Dr. Pavy's and Mr. Bryant's on February 22, 1872.





ON THE EFFECTS
OF
WARM CLIMATES
IN THE TREATMENT OF
PULMONARY CONSUMPTION,
AS EXEMPLIFIED BY
AN ANALYSIS OF TWO HUNDRED AND FIFTY-ONE CASES.

BY
CHAS. THEODORE WILLIAMS, M.D. OXON., F.R.C.P.,
PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION AND DISEASES OF THE
CHEST, BROMPTON.

Received March 26th—Read April 23rd, 1872.

THE selection of a suitable winter climate is a most difficult question in the treatment of consumption, and one which affects, more than any other, the plans of the patient and of his friends, often entailing an exile from home and its comforts, a separation from those most dear, and the sacrifice of ordinary occupations or pursuits. When we consider, therefore, the important interests involved in the answer to this question, we are bound to spare no pains to arrive at a decision, in carrying out which the invalid may secure a fair prospect, if not a certainty, of improvement in health.

Now, what are the grounds on which a physician bases his opinion in this weighty matter? They may be briefly summed up as follows:—

1st. The alleged immunity of some localities from the disease the patient is suffering from. This is certainly an

a priori ground for recommendation, but when we come to examine the climates of the localities known to be exempt from phthisis, we are met with such a contrast of atmospheric conditions, that it is evident the immunity cannot be assigned to the influence of climate alone, but to peculiarities in the out-door life, food, and habits of the natives. What specific qualities of climate can be common to Iceland with its ever-varying meteorology, to the cold steppes of Tartary, lying a 100 feet below the level of the sea, to the lofty plateaux of the Andes, 8000 to 10,000 feet above it, and the hot presidency of Madras? And yet all these places are free, or nearly so, from phthisis! We do not, therefore, gain much assistance in the selection of a climate from this source, though by close imitation of the conditions under which the inhabitants of these fortunate countries live, individuals predisposed to phthisis might possibly avert its onset. On the other hand, we should not dismiss from consideration certain climates only on the ground that they are not free from phthisis, as experience has shown that this is the case even in those health resorts which have proved most beneficial to British invalids.

2ndly. The existence in certain localities of atmospheric conditions the reverse of those under which the disease was contracted, as a dry warm climate, when the disease has been contracted in a damp cold one; or, again, a cold atmosphere of great purity, when the malady has arisen under the influences of heat and bad ventilation. This is a very reasonable ground for selection, and in the absence of better data, and with certain restrictions, a very practical one, though difference of food, variability of seasons and individual idiosyncrasies will sometimes upset our calculations, and turn what appeared a probable success into an undoubted failure.

In selecting our climate on this principle, it were well to bear in mind that the causation of phthisis is probably two-fold—*inflammatory* and *septic*.

By *inflammatory*, I mean those influences which excite or keep up inflammatory affections of the lungs, the products of which are apt to be of a lowly organized kind, tending to

contraction or caseation ; such influences are, the prevalence of cold and damp, and frequent changes of temperature. Consumption arising in this way is generally a limited disease of one or both lungs, running a chronic course, and is known chiefly in cold and temperate climates.

By septic influences I mean those which tend to blight and corrupt the bioplasm of the blood or lymphatics generally, and thus sow the seeds of decay. Such are the combination of warmth and humidity, foul air, bad or insufficient nourishment, certain weakening diseases, and other general debilitating causes. Consumption having this origin exhibits very marked constitutional symptoms, is often tubercular, and runs a more or less rapid course, and often attacking other organs besides the lungs. This is the type which, as Dr. Guilbert has pointed out, prevails in hot countries, as along the littoral of Peru, in the West Indies, and on parts of the Coast of Africa ; but it is also to be found in northern countries, then arising principally from the above-mentioned septic causes or from the neglect of certain rules of hygiene. What the exact nature of this septic influence is, and whether the power of thus depraving the nutrition of the blood and lymph, and causing the formation of phthinoplasms, resides in germs often present, but requiring certain conditions for their development, it is at present uncertain, but judging from the direction modern researches are taking, such an origin seems by no means improbable.

Now, viewing the causation of phthisis in this light, its treatment by climate would naturally depend upon whether the case had a septic or an inflammatory origin. For the former a dry cold¹ air of great purity is desirable, as Archibald Smith² has well shown ; while for the latter, in order to avoid

¹ We must not omit to add that the atmosphere should be still, otherwise the cold is not well borne by consumptive patients. During a recent visit to Davos-Platz, the principal high altitude winter station of Switzerland, I ascertained from several phthisical patients that they did not feel the cold in winter, and could sit with the windows open for hours at a time, provided there was no wind ; but that wind, even with a moderate temperature, tried them severely.

² 'Edinburgh Medical and Surgical Journal,' 1840.

fresh inflammatory attacks a combination of dryness and warmth seems indicated.

The 3rd, and far most important ground for selecting a winter station, lies in the ascertained results of certain climates on similar cases; this, after all, being entitled to our gravest consideration, as it furnishes the strong argument of *fact*, while the other two are more or less *a priori* grounds, and though valuable in the absence of the third, are not to be compared with it for validity.

Unfortunately, though considerable experience must have been stored up by practitioners at home and abroad of the results of climate on the various forms of phthisis, few records have been offered to the profession, though those made available are of the highest interest. It is, however, undoubtedly to the medical men living at the various health resorts that we ought to look for careful clinical observations on the influence of climate. Dr. Walshe justly remarks—"It cannot be too deeply regretted that local practitioners employ their leisure hours in adding to the already too ponderous mass of meteorological and picturesque data concerning their various spots of residence, rather than in conscientiously jotting down in writing the exact conditions of their patients on arrival and on departure, and in due season submitting a series of such observations to collation and analysis."¹ This advice is the more reasonable as the "meteorological and picturesque data" could be equally well collected by other and non-medical residents, as has been done in some localities, who could not, of course, contribute the medical facts required.

The cases which have hitherto been published to exemplify the effects of climate in phthisis have rarely been sufficient in number to admit of the framing of statistics, but many striking examples of the effects of climate have been recorded, among which few can compare with the admirably described ones of Dr. Hermann Weber in the fifty-second volume of this Society's 'Transactions.'²

¹ 'Diseases of the Lungs,' 4th edition, p. 584.

² The selection of the high altitude stations for consumptive patients is

The present contribution is intended as an attempt to furnish statistical information on this point, and is a sequel of a paper read before the Society last year, and published in vol. liv of the 'Transactions.' In that paper an account was given of 1000 cases of consumption, taken from the practice of Dr. Williams and myself, tabulated under certain headings; the average duration was estimated, as well as the influence which *age, sex, family predisposition, and origin* exercised on the same. The consideration of the influence of climate was postponed, and is embodied in the present paper.

Of the 1000 patients who had been one year and upwards under observation, 251 were submitted at some time or other to the influence of warm climates in localities out of the United Kingdom, for periods varying from one to eleven winters. Their general condition and the state of their lungs were noted before quitting England, and in most cases again registered on their return. In addition to this, some account of their progress during their absence was furnished either by the patient or by the medical attendant; and a special note was taken of whether they took oil regularly, as they were ordered to do, or trusted to climate alone, as many are wont to do. A specimen of the mode of tabulation is annexed.

generally based on the 1st or "immunity ground," but the results obtained by Archibald Smith, Guilbert, Brehmer, Weber, and others, warrant us in claiming also for it the 3rd or "experience" ground.

I trust that medical men will be able in time to overcome the prejudice which at present prevails among our countrymen against this form of treatment, and that a fair trial will be made of it by us, as is being done by the Germans, Swiss, Dutch, Belgians, and South Americans.

In addition to the good results obtained at Davos and Görbersdorf, we must bear in mind that in South America it has long been not only the medical but the popular practice to send consumptives to the higher plateaux of the Andes, and that there the mountain cure is looked upon as the "very grammar of phthisical therapeutics;" also that cases of arrest have been by no means confined to South Americans, many Europeans having equally benefited by a stay at Santa Fè di Bogota, Huanaco, Jauja, and Tacna, at all of which places suitable accommodation can be procured.

How these mountain climates act on the lungs, whether, as Dr. Walshe sensibly suggests, by causing increased capacity of the chest through continual inhalation of rarefied air, or whether, according to Brehmer ('Die Chronische Lungenschwindsucht und Tuberculose der Lunge,' 2nd ed., 1869) it is to be assigned to acceleration of the pulse giving rise to enlargement of the heart, I have no space here to discuss. Brehmer's theory that consumption often arises from a small heart with feeble and lax muscular fibres, has been well criticised, and, to my mind, refuted by Dr. C. v. Mayer in his 'Ätiologie und Therapie der Lungenschwindsucht,' 1871.

SPECIMEN TABLE.

No.	Sex.	Age.	Origin and nature.	Stage.	Climate.	Effects.		Duration.	Remarks.
						Local.	General.		
885	M	25	Catarrhal phth.	1st right	West Indies 3 yrs., voyages to & from	Advance of disease	Improved	13 5	
895	M	38	Chronic phth.	2nd left, 1st right	Nice 1 winter	Advance	Ditto	8 3	Dead.
902	M	26	Ditto	1st left	Rome 1 winter	Extension and advance	Worse	1 2	
906	M	21	Chronic phth.	1st right	Hyères 1 winter.	Decrease and cure	Much improved	5 6	Nova Scotia in summer.
909	M	33	Phth. after pleuropneum.	Ditto (morb. cord.)	Madeira 1 winter	Advance	Worse	8 6	Dead.
912	M	30	Catarrhal phth.	1st both	Madeira 1 winter	Advance	Improved	15 1	
905	M	23	Chronic phth.	Ditto	S. Europe 1 winter, Pau 1 winter	Ditto	Much improved	4 8	
941	M	32	Phth. after pleuropneum.	Ditto	S. Europe 1 winter	Decrease	Stationary	5 0	Dead. Oil had much greater effect than climate, for with its continuance or omission the patient would gain or lose as much as [35 lbs.
855	M	47	Catarrhal phth.	1st left	Florence 1 winter, Pau 1 winter	Advance		4 6	
856	M	33	Chronic phth.	1st both	Madeira 2 winters, S. Europe 1 winter	Decrease and slight extens.	Much improved	12 0	
860	M	22	Catarrhal phth.	2nd right, 1st left	Pau 1 winter, S. Europe 1 winter	S. Advance	Ditto	1 7	
865	M	18	Chronic phth.	1st both	Nice 1 winter	Ditto	Improved	3 4	
869	M	32	Scrofulous phth.	2nd right	Naples 1 winter	Decrease	Much improved	3 4	
879	M	16	Phth. after pleuropneum.	1st left	Nice 1 winter	Stationary	Ditto	11 9	Previous to wintering at Nice spent 1 year in Canada and greatly improved in flesh and phys. signs.
874	M	39	Ditto	2nd right	Hyères 1 winter	Ditto	Improved	10 0	
					Rome 1 winter, Nice 1 winter	Decrease	Much improved		

While laying a brief account of these cases before the Society I propose, as I proceed, to compare their main features with those of the total number, so as to enable those present to judge, 1stly, whether the cases were exceptional or not; and, 2ndly, whether their going abroad was of advantage or disadvantage to them.

Sex.—190 were males and 61 females. The large preponderance of the former might be expected from the ease with which they can travel abroad compared with ladies, who often require relations or friends to accompany them.

Age.—The ages of the patients at the time of their being attacked has been arranged in the following table, as also the percentages of the different decades of life :—

TABLE I.—*Showing age at time of attack of 251 patients who passed one or more winters abroad.*

	Males.		Females.		Total.	
	No.	Percentage.	No.	Percentage.	No.	Percentage.
Under 20 years.....	23	12·10	20	32·78	43	17·13
20 to 30 „	89	46·74	30	49·18	119	47·41
30 to 40 „	51	26·08	8	13·11	59	23·50
40 to 50 „	22	11·57	2	3·27	24	9·56
50 to 60 „	3	1·50	...	...	3	1·11
60 and upwards	2	1·05	1	·61	3	1·11
	190		61		251	

The average age of attack of the males was 29·04, and of the females 23·59; nearly half of both sexes being attacked between 20 and 30. Comparing this table with a similar¹ one of the whole number of patients, we find an excess of nearly 6 per cent. in the decade, 20 to 30 for both sexes collectively, and also a preponderance of 7½ per cent. among the males alone in the same period. Among the females the percentages in the decades—under 20, 20 to 30, and 30 to 40—were all slightly higher.

We may conclude, therefore, that the age of attack among these climatic cases did not differ greatly from that of the whole

¹ Vide Vol. LIV, p. 101.

number; but that the females who went abroad were attacked by the disease rather earlier than the other female patients.

Family predisposition was present in 131 cases, or in 52·19 per cent., and hereditary predisposition in 68, or in 27·9 per cent.: both percentages being higher than those of the whole number; which were for family predisposition 48·4 per cent., and for hereditary 25 per cent. This may perhaps account for the earlier onset of the disease among the climate females, as I have demonstrated,¹ that the chief influence of family predisposition lies in precipitating the attack of the disease among females.

Origin and nature of disease.—While the patients one and all presented the familiar group of symptoms characteristic of consumption, they included examples of many of the varieties of that greatly varying, but still definite, disease—11 were instances of scrofulous phthisis: that is, the cases were complicated by the presence of scrofulous disease of the bone, fistula in ano, enlarged suppurating glands, &c. In 55 the symptoms supervened on attacks of pneumonia, pleurisy, and pleuro-pneumonia, the unresolved products of inflammation remaining behind after the attack. In 41 the disease had a catarrhal origin, following attacks of acute or chronic bronchitis; 2 had a syphilitic origin; 6 were cases of chronic asthma, lapsing into phthisis; 6 were instances of the variety of phthisis, which I have described as the “hæmorrhagic.”² The remaining 130 presented the usual characters of chronic progressive consumption.

Hæmoptysis was noted in some degree or other in 157 instances, or in 62·54 per cent. In the 1000 cases the percentage was 57.

State of lungs.—For the purpose of clearly demonstrating the condition of the lungs in these patients before they quitted England, and the effects of the various climates during their stay abroad, a table has been constructed, which, under the headings of “State of Lungs before leaving England,” “State of Lungs on return to England,” gives the most important facts.

¹ Op. cit.

² ‘Pulmonary Consumption,’ p. 155.

PULMONARY CONSUMPTION.

241

235

Stage.	No.	Percentage.	State of lungs before leaving England.	Cure.	Decrease.	Stationary.	Advance.	Advance & Extension.	Extension.	Unknown.	Totals.
1st	153	61.00	69 had the <i>right</i> lung alone affected 38 had the <i>left</i> lung alone affected 46 had <i>both</i> lungs affected	5 2 1	21 15 19	13 4 3	11 3 15	9 6 6	6 6 2	4 2 0	69 38 46
	153			8	55	20	29	21	14	6	153
2nd	54	21.51	14 had the <i>right</i> lung alone affected 5 had the <i>right</i> lung in 2nd stage, and the <i>left</i> in 1st 19 had the <i>left</i> lung alone affected 8 had the <i>left</i> lung in 2nd stage, and the <i>right</i> in 1st 8 had <i>both</i> lungs in 2nd stage.....	0 0 2 0 0	7 1 11 1 3	0 0 2 3 1	5 3 3 3 3	1 0 1 0 1	0 0 0 0 0	1 1 0 1 0	14 5 19 8 8
	54			2	23	6	17	3	0	3	54
3rd	44	17.52	15 had the <i>right</i> lung alone affected 6 had the <i>right</i> lung in 3rd stage, and the <i>left</i> in 1st 12 had the <i>left</i> lung alone affected 8 had the <i>left</i> lung in 3rd stage, and the <i>right</i> in 1st 8 had <i>both</i> lungs in 3rd stage.....	1 0 0 1 0	5 2 2 2 2	3 1 2 2 0	1 2 3 4 1	0 1 1 0 0	1 0 1 0 0	4 0 3 0 0	15 6 12 8 3
	44			2	13	7	11	2	2	7	44
	251			12	91*	33	57	26	16	16	251

In 84 of the 251, or in 33.06 per cent., both lungs were diseased at the time of departure from England:—Of those in the 1st stage in 46, or 30.06 per cent.; of those in the 2nd stage in 21 or 39.00 per cent.; of those in the 3rd stage in 17 or 38.63 per cent.
Of 167, or 67 per cent., in whom one lung alone was diseased, the right was attacked in 98 instances, or 39.04 per cent.; the left was attacked in 69 instances, or 27.49 per cent.
* In five decrease in one lung was accompanied by slight extension of the disease to the other.

Results.

		No.	Percentage. (Unknown excluded.)
<i>1st Stage:</i>			
Cure.....	} Improved	63	42.56
Decrease			
Stationary		20	13.51
Advance	} Worse	64	43.53
Advance and extension			
Extension			
Unknown		6	—
<i>2nd Stage:</i>			
Cure.....	} Improved	25	49.21
Decrease			
Stationary		6	11.76
Advance	} Worse	20	29.21
Advance and extension			
Extension			
Unknown.....		3	—
<i>3rd Stage:</i>			
Cure.....	} Improved.....	15	40.54
Decrease			
Stationary		7	18.91
Advance	} Worse	15	40.54
Advance and extension			
Extension			
Unknown.....		7	—
<i>Total:</i>			
Cure.....	} Improved.....	103	43.64
Decrease			
Stationary		33	13.98
Advance	} Worse	99	41.94
Advance and extension			
Extension			
Unknown		16	—

From this we see that 61 per cent. were in the 1st stage, $21\frac{1}{2}$ per cent. were in the 2nd, and $17\frac{1}{2}$ per cent. in the 3rd stage, when they quitted England. We also see that 33 per cent. had both lungs affected, and 67 per cent. but one lung attacked; the right alone in 39 per cent., and the left alone in $27\frac{1}{2}$ per cent. On comparing these with the figures of the 1000 cases, we find that the climate cases had 5 per cent. fewer in the 1st stage, but $3\frac{1}{2}$ per cent. more in the 2nd, and 3 per cent. more in the 3rd stage.

On the other hand, the percentage of cases in which both lungs were involved is 12 per cent. less than in the whole number, the ratio of the percentages being 33.06 to 45.40.¹ It appears, therefore, that the disease was slightly more advanced in these cases, but, at the same time, much more local in its character; the opposite lung being attacked in the comparatively small percentage of 33, and it must be admitted this last feature would form a favorable element in the prognosis certainly sufficient to counterbalance the somewhat larger percentage of 2nd and 3rd stage patients.

Before considering the state of the lungs on the return of these patients to England, we must give some account of the climates in which they lived for periods varying from one to eleven winters. In some of the more distant localities, such as New Zealand, the Cape, &c., the summers were also passed.

It must here be noted that in the selection of their wintering place the patients did not always act in accordance with the physician's advice, but often as fancy, convenience, or pleasure prompted, and thus may be explained the appearance, in the subjoined list (Table III) of certain localities, a residence in which could hardly be deliberately recommended by medical men. Though the list is a tolerably long one, I hope the Fellows of this Society will not view it as including all the climates of which Dr. C. J. B. Williams

¹ This is a considerably higher figure than that recorded in my last paper, which was intended to include only cases of undoubted disease of the opposite lung. Here, as also in the climate percentage, cases of slight, and often dubious, disease of the other lung are comprised.

other words 65 per cent. were improved to a greater or less extent, 6 per cent. remained stationary, and 29 per cent. became decidedly worse; 13 patients died when abroad. This high percentage of general improvement, amounting to about two thirds, cannot but be considered as satisfactory.

Local effects.—The state of the lungs of these patients on their return to England has been reported as, 1st, *Cure*, where little or no physical signs remain; 2nd, *Decrease*; 3rd, *Stationary*; 4th, *Advance*, signifying progress in the way of softening and excavation; 5th, *Extension*, where a greater amount of lung surface was attacked, either of the same or of the opposite lung; 6th, *Advance and Extension*, when both these processes took place.

Table II (p. 241) shows that of the 251 cases, 12 returned home cured. In 91 the disease decreased, in 33 it remained stationary; in 57 it advanced, in 16 it had extended, in 26 it had advanced and extended, and in 16 the local result was unknown.

If we now bracket the "cure" and "decrease" cases under the head of *Improved*, and the "advanced," the "extended," and the "advanced and extended," under the head of *Worse* and at the same time exclude the "unknown" ones, we arrive at the following percentages:—*Improved*, 43½ per cent.; *Stationary*, 14 per cent.; *Worse*, 42 per cent.; the improved being thus only 1½ per cent. more than the worse.

Examining the changes according to stages, we find that out of the 153 in the 1st stage, the improved amounted to 42½ per cent., the worse to 43½ per cent., and the stationary to 13½ per cent.; out of 54 in the 2nd, 49½ per cent. were improved, 11½ per cent. remained stationary, and 29½ per cent. became worse. Out of 44 in the 3rd stage the percentage was 40½ for both improved and worse, while that of the stationary was nearly 19 per cent. Among the curious features in this result, one is that the largest percentage of "improved" and the smallest of both "stationary" and "worse," occurred in the 2nd stage, although *a priori* reasoning would lead us to a different conclusion. It is quite possible that some cases may have been included where

[illegible]

crepitation indicated congestion or deposit, and not necessarily softening, as we know it is not always easy to be decisive on this point. Another curious feature is, that the percentages of "improved" and "worse" were equal both in the 1st and 3rd stages, which when considered in connexion with the small number of stationary cases, show that the climates had a decided effect one way or another, either towards hastening the progress of the disease, or towards diminishing its amount.

The result of the 3rd stage cases is encouraging as regards the expediency of sending patients with cavities abroad, as excepting the dangers from pneumothorax, and from hæmoptysis having its source in pulmonary aneurisms, cases of limited cavity do not seem to come off worse than other cases. The number of cures was, as might be expected, largest in the 1st stage, amounting to 8, of which 7 were unilateral cases and 1 bilateral. Two cases occurred in the 2nd stage; in both cases the left lung alone being affected, and 2 in the 3rd stage, in each of which both lungs were diseased.

A comparison of these local with the general results before mentioned will show how common it is, as all who have had any extensive experience of consumption are aware of, for a patient to gain colour, strength, flesh, and weight, while little or no improvement takes place in his lungs, and often indeed a decided progress of the disease is attested by the physical signs.

We can now return to the list of climates and see how the various groups affected these patients; and here I must trespass on the indulgence of the Society in order to explain the way in which the results of the climate sheet have been arranged. In tabulating the effect of the *different* localities on each patient, it was thought sufficient, as the general and local results of the whole set of climates had been already given, to record in this table¹ a single report of the patients' condition, founded on both local and general results, by striking a balance between the two, the same terms being used.

¹ Table III.

TABLE III.—*Showing influence of warm*

		Arcachon. Winter mean temp. 46° F. (Lombard); sedative.
Calm inland temperate climates (moist)	{	Pau. Winter mean 42·8° F.; rainfall 48 inches; rainy days 11 sedative
		Bagnères de Bigorre. Climate similar to that of Pau
		Rome. Winter mean 48·90° F.; rainfall considerable; entirely exposed to winds; more stimulating than Pau
	{	Hyères
Riviera.		Cannes
Nice and Cimiez...		
Mentone		
San Remo		
Riviera generally		
		Enjoying a winter climate warmer than England by at least 3° F., much moist, and far more stimulating. Winter mean 47° F. to 49·5° F.; rainfall 45 to 50 inches; number of rainy days 45 to 50; well sheltered from cold winds; stimulating
Dry climates of the Mediterranean Basin (marine) ...	{	Malaga. Winter mean 56 F.; rainfall 16½ inches; rainy days 87; well sheltered, and stimulating.....
		Ajaccio. Winter mean 53° F.; large number of rainy days; well sheltered; less stimulating than Malaga
		Palermo. Winter mean 53° F.; open to extremes of temperature; imperfectly sheltered.....
		Malta. Winter mean 57·46 F.; drier than Palermo; much exposed to wind.....
		Corfu. Winter mean 54·28 F.; large rainfall; great vicissitudes of climate
		Cyprus.....
		Algiers. Winter mean 56° F.; rainfall 32·18 inches; rainy days 87; moister than Riviera; stimulating
		South of Europe generally, including winters spent partly at one and partly at another of the above stations, or else in travelling in Italy, Spain, &c.
		Egypt and Syria. Winter mean 58·52 F.; at Cairo very little rainfall; rainy days not exceeding 15; extreme dryness
		Very dry climates ...
		Tangiers. Climate probably intermediate between Algiers and Madeira
		Madeira
Moist and warm Atlantic climates (marine)	{	Madeira. Winter mean 60·60 F.; rainy days 88; rainfall 40 inches; warm and moist; sedative
		Canaries (Teneriffe)
		St. Helena.....
		West Indies
		India (generally)
		New Zealand
		South America (Andes).....
		Sea voyages to Australia, America, India, China, Cape, and West Indies

*This table is printed (mostly) as printed from
 being but including them in all but 16 cases. beds
 imates (foreign) in consumption in 251 cases. p. 241-245*

No. of patients.	Result.				Average No. of winters per patient.		Percentages.		
	Much Improved.	Improved.	Stationary.	Worse.			Much im- proved and improved.	Stationary.	Worse.
1	...	1	...	...	...				
43	5	16	2	20	1.70	} ...	50.00	4.55	45.45
1	1	...	...	...	...				
18	4	6	2	6	1.23	} ...	55.56	11.11	33.33
23	4	9	6	4	...				
19	6	6	3	4	...	} ...	58.53	20.73	20.73
18	6	8	3	1	...				
12	2	3	2	5	1.64				
3	...	...	2	1	...				
7	1	3	1	2	...				
8	2	4	2	...	1.56	} ...	58.00	21.00	21.00
1	...	...	1	...	...				
1	...	...	...	1	1.51	} ...	62.50	20.39	17.10
2	1	...	1	...	...				
1	...	1	...	...	...	} ...	65.00	25.00	10.00
1	...	...	...	1	...				
4	...	2	...	2	...				
52	16	21	5	10	...				
20	6	7	5	2	1.30				
9	1	3	2	3	1.34	} ...	58.62	24.13	17.24
3	2	1	...	...	...				
63	14	20	9	20	1.61	} ...	53.81	14.28	31.91
1	...	...	...	1	1.71				
1	...	1	...	...	...				
5	1	...	1	3	...				
10	7	2	...	1	3.00				
4	...	3	1	...	...	} ...	51.43	14.28	34.29
1	1	...	...	...	...				
18	7	9	1	1	2.50				
350	87	126	49	88	...				
						} ...	89.00	5.50	5.50

Average of winters passed by each patient abroad, 2.36

Let us first consider the moist climates.

The calm inland group of Pau and Bigorre furnishes, out of 44 cases, nearly equal numbers of "improved" and "worse," with only $4\frac{1}{2}$ per cent. "stationary;" that is to say, it gives the largest percentage of "worse," and the smallest of "improved" and "stationary" in the sheet.

Of the 18 patients who wintered at Rome $55\frac{1}{2}$ per cent. improved, 11 per cent. remained stationary, and 33 per cent. or about one third became worse. The group of moist Atlantic climates with its 70 patients gives $51\frac{1}{2}$ per cent. "improved," $14\frac{1}{2}$ per cent. "stationary," and $34\frac{1}{2}$ per cent. "worse," the 2nd largest proportion of "worse."

The Madeira patients, which form the chief quota of this class, furnish the same percentage of stationary, but a somewhat higher one of improved and a rather lower one of worse. It will be seen, then, that the moist climates, both cold and warm, yield a percentage of improved varying from 50 to 55, of stationary from $4\frac{1}{2}$ to $14\frac{1}{2}$, and of worse from 32 to 45.

Let us next examine the effects of the dry climates. The sheltered Genoese Riviera for 82 patients shows $58\frac{1}{2}$ per cent. improved and $20\frac{3}{4}$ as a percentage for both stationary and worse.

The Mediterranean Basin, which includes, in addition to the Riviera, Malaga, Algiers,¹ and the Mediterranean Islands (Ajaccio, Corfu, Palermo, Malta, Cyprus), yield somewhat

¹ Professor Biermer, of Zurich, in a very interesting paper, "Ueber Prophylaxis und Behandlung der Chronische Lungenschwindsucht" ('Correspond. Blatte für Schweiz: Aerzte No. 12, 1872), divides warm climates into "stimulating" and "sedative," and includes Malaga and Algiers in the latter class, associating them with Madeira, Pau, and Meran; in the former are arranged Cairo and the Riviera. Professor Biermer gives no reasons for this classification, and I am quite sure that an examination of the climatology of Malaga and Algiers, as well as the results of the preceding table, will convince him that they do not differ greatly in climate from the other Mediterranean stations, but are separated by vast contrasts in point of temperature, humidity, and other qualities, from both Madeira and Pau. Professor Biermer gives a most favorable report of Davos, and says, "The south heals catarrh, but the Alpine climate improves the constitution," and chiefly by increasing the appetite and powers of digestion.

similar percentages, while if we take in the 52 patients who wandered about in warm parts of the south of Europe, dividing their winter season among various stations, we obtain 62½ per cent. improved, 20 per cent. stationary, and 17 per cent. worse,—a highly satisfactory result.

The very dry climates of Egypt, the Cape, &c., were tried in 29 cases and yielded 58½ per cent. improved, 24 per cent. stationary, and 17½ per cent. worse.

In this group Egypt furnishes 20 out of the 29 patients, and shows itself *facile princeps* among the winter stations of the list. Counting only 10 per cent. worse, it numbers 65 per cent. improved, and 25 per cent. stationary.

The *most favorable* results, however, are obtained from sea voyages, which in 18 cases yield 89 per cent. improved and only 5½ per cent. stationary, and the same percentage worse.

It must be admitted that these figures testify very strongly against the moist climates, whether temperate like Pau and Rome, or warm like Madeira and the West Indies; for while the percentages of their *improved* are in every instance somewhat lower than those of the dry climates of the Mediterranean and Africa, those of the *stationary* are very considerably so, and this difference is unfortunately explained by the moist climates having a large preponderance of worse, for whereas the percentage of worse among the dry climates varies from 10 to 21, that of the moist varies from 32 to 45, at least double and in one instance treble.

It may very naturally be asked, Might there not have been some great difference in the patients sent to the various stations? were not the most advanced cases sent to Pau, and Madeira, and Rome, and the less advanced to the Mediterranean Coast and Egypt, thus explaining the results?

This is by no means easy to determine, as cases of phthisis contain certain elements which hardly admit of exact comparison, such as the amount of irritation to the system, the degree of pyrexia, the rate of progress of the disease, &c.

If, however, it be sufficient to judge by the number of cases in each stage, and also by the number which had both lungs involved, the following table which I have constructed may give some idea on the subject.

TABLE IV.—*Showing the relative conditions of lung in patients wintering in various climates (dry and moist), expressed in percentages.*

	First stage.	Second stage.	Third stage.	Both lungs affected.
	Per cent.	Per cent.	Per cent.	Per cent.
Pau	52·20	34·00	13·60	38·68
Madeira.....	62·85	20·00	17·14	40·00
Rome.....	72·22	16·67	11·11	38·89
South of Europe	58·55	20·38	21·05	35·53
Egypt, Cape, &c.	62·05	27·58	10·34	20·68
Sea voyages	72·22	11·11	16·67	27·78

From this it appears that in point of bilateral affection the patients who went to the moist climates were the worst. In this particular, however, the south of Europe cases differed only by 5 per cent. from the Madeira ones, the highest percentage, but the sea voyage patients were more favorable, and the Egypt cases most so, of all, diverging from the Madeira ones by 20 per cent. On the other hand, in point of stage, the cases sent to Pau were slightly the most unfavorable; then come those of the south of Europe, Madeira and Egypt following at a considerable interval, and, lastly, as the most favorable were the Roman and sea voyage cases. Viewing the patients from both aspects (stage and double affection), we must conclude that those wintering at Pau were slightly more unfavorable cases than the rest, and that the sea voyage patients were rather more favorable; but as regards the others there was no great difference; the south of Europe cases not being more favorable than the Madeira ones, and if anything less favorable than the Roman ones.

Such being the case the natural inference is that it was something inherent in the climates, and not in the patients, which caused so great a difference in the results of the winters passed in the various localities; for here it must be remembered that several of the patients tried different health-resorts in succeeding winters, thus affording us opportunities of comparison between them.

What, however, is there in the climates of Pau, Rome, and Madeira to render them less beneficial to consumptive patients than those of the Mediterranean and of Egypt?

Pau, the worst offender in the list, has a winter mean temperature lower than that of Torquay or Penzance, and considerably below that of Nice, and is subject to great thermometrical variations, probably on account of its nearness to the Pyrenees, which in winter are covered with snow, and like all high mountains attract clouds. It has a considerable rainfall, a large number of rainy days, and occasional snow-falls; but the climate is wonderfully free from cold winds, or indeed from any winds at all. It is stated that there is marked absence of communicable humidity in the air, and that this is due to the dry gravelly soil on which Pau stands; but though I possess careful hygrometric returns of this place, they by no means prove this, and Dr. More Madden¹ states that in some comparisons which he made on the results obtained at Kew and Pau during the winter 1862 the hygrometric difference between these two localities was almost nil. Pau has been perhaps more highly eulogised than any climate in Europe, and I have failed to discover fair grounds for such praise, but, as Dr. More Madden says, "no amount of eulogy affects the temperature of a locality, or adds a degree to the heat marked on the scale of the thermometer." It has a cold and, compared with the dry climates of our list, a damp climate, and the stillness of the atmosphere does not at all make up for the large number of rainy days, which necessitate confinement to the house, or for the vicissitudes of temperature, which induce inflammatory attacks. I lay special stress on these last two evils because, as far as I can judge from the records of the cases, they were the principal reasons of the patients not doing so well as in other localities. The real virtue of Pau is as a spring climate, when some of the more southerly climates prove either too windy or too hot.

Rome, with a winter mean about the same as Nice, is admitted to have a very changeable climate, attributable to its unsheltered position in the midst of a large and swampy

¹ Change of Climate, p. 253.

plain; this imparts to its atmosphere a considerable amount of moisture, which is not to be wondered at when we remember the size of the Campagna and the sponge-like pozzuolana soil on which the city is built. This absorbs moisture with marvellous rapidity, and under the influence of the sun as quickly exhales it. A piece of it brought into a room will be found to gain weight in a few minutes, thus showing its power of absorption. Rome has a considerable rainfall and a large number of rainy days, and may fairly be considered a colder and moister climate than that of the Riviera. I need not dwell further on the merits or demerits of Rome, as I have elsewhere¹ given reasons for its utter unfitness as an invalid resort, the cogency of which its recent transformation into the capital of Italy does not alter, but I may remark in passing, that if the Campagna is to be rendered healthy it will be necessary not only to drain it and to build upon it, but following Padre Secchi's² advice, to thickly replant with trees the surrounding hills, and thus localise the rainfall and retain in their neighbourhood the moisture which, now coursing down the hill-sides, collects in the vast plain and renders it marshy.

Madeira and the other Eastern Atlantic islands enjoy a mean winter and spring temperature, 12 to 19 degrees higher than that of Nice, of extraordinary equability, and are free from cold winds, though by no means from hot ones, as those who have had experience of the Leste well know; the number of rainy days is small. At first sight this island climate, subject to the strong marine influences of the Atlantic, and remarkable for steadiness of temperature, does not seem to have much in common with the variable climates of Pau and Rome, but there is one feature which characterises all the three, and is possessed to a very large extent by *Madeira*; that is, *humidity* giving rise, probably, to its markedly sedative influence. The atmosphere is charged to saturation, and according to Dr. Walshe³ the damp is so extreme that boots laid aside for a day are covered with mould, lucifer matches

¹ 'Climate of South of France,' 2nd edition, p. 100.

² Sul Clima di Roma, Lettura Seconda.

³ Op. cit.

cease to be inflammable, and iron rapidly oxidizes. The combination of the high temperature with this excess of moisture is stated to be the cause of the diarrhoea and the great languor which many patients experience, and also of their relief from the symptoms of pulmonary irritation.

Among our cases the patients who improved were those who took the oil regularly and were strong enough to ride on horseback about the island and thus to dispense with the truly passive exercise of being carried in a hammock. The "worse" class consisted of patients who could only take passive exercise, and losing strength and appetite became intolerant of the oil. In these softening and excavation proceeded very rapidly. These results differ considerably from Dr. Lund's¹, who, in 100 cases wintering at Madeira, found that in 49 the disease was arrested and in 53 it went on. Dr. Lund's proportion of 1st stage cases was smaller than our own, which would have led us to expect less favorable results. Dr. Renton,² however, states that of 47 cases of confirmed phthisis arriving at Madeira 32 died in 6 months and the rest slowly followed, but that of 35 cases of incipient, or (as the diagnosis was made in 1827) doubtful phthisis, 26 returned to England improved. Of the 20 Brompton Hospital patients who were selected as cases likely to profit by the climate, only 3 returned improved, 1 dying at Madeira and the rest losing flesh and showing signs of progress of the disease. These took no oil, and somewhat confirm the result of our statistics. I may mention that one of these Madeira patients is now an inmate of the Brompton Hospital under the care of Dr. Quain; fifteen years have elapsed since the commencement of his symptoms, and he has had signs of cavities for the last eleven years. This patient derived no benefit from Madeira, but by regularly taking the oil and getting sheltered in the Brompton Hospital during the winter, he manages to pass a very tolerable existence.

Although the statistics of Madeira are so unfavorable, I find that many of the "improved" class exhibited rapid and

¹ 'Association Medical Journal,' 1853.

² 'Edinburgh Medical and Surgical Journal,' vol. xxvii.

remarkable recovery, cavities closing, and the patients' health becoming stronger in a few months.

The West Indies has been classified with Madeira as a moist warm climate, though the mean temperature is higher. The results of a few patients who wintered there are even more unfavorable than those which Madeira has furnished.

The general conclusion as to the climates of Pau, Rome, Madeira, &c., is, that the amount of moisture present in the atmosphere as well as the absence of a proper degree of stimulating element renders them less suitable for consumption generally than drier and more bracing climates.

It may be urged in answer to this conclusion that, though these climates are unsuited to the ordinary type of chronic consumption, they may through the very absence of exciting qualities be useful in cases of phthisis marked by great irritation of the intestinal tract or of the vascular system, and attended by a good deal of pyrexia. Too few examples of this kind are included in our numbers to determine this point statistically, but from all that I know of this class of patients I should greatly doubt the advisability of sending them abroad at all. Some few cases that I have seen returning from Madeira have done very badly there; as a rule their strength is hardly sufficient to justify their being banished from relatives and home comforts.

The rest of our list need not detain us long; the percentages of the dry climates speak for themselves. It may be well to note that the percentages of the South of Europe taken generally are slightly more favorable than those of the Rivièra considered alone, and from this we may deduce that it is the dry sunny climate of Eastern Europe combined with the warming influence of the Mediterranean that acts beneficially on consumptive patients, and that it is by no means necessary for them to remain cooped up the whole winter in one well-sheltered nook. Those patients seem to have benefited most who spend part of their time in travelling about from place to place, dividing their time among the different winter stations.

The results of Egypt among the very dry winter climates are most striking, and show what a warm, dry, and exhilarating atmosphere like that of Upper and Middle Egypt can effect, in spite of the disadvantages of bad food and a great deal of discomfort. It is much to be regretted that the great cost of a winter in Egypt and a voyage up the Nile, places it out of the reach of the greater number of phthisical invalids.

Among the miscellaneous climates it may be noted that India gives good results, but it should be mentioned that of the 9 patients who resided in different parts of that hot country, 6 were in the first stage, and only 2 in the third. One of these who had a very large excavation in one lung and some consolidation of the other, lived for upwards of ten years, and during the greater part of this time did active duty as a colonel of a regiment in India, also engaging in various field sports, including tiger-hunting. The only patient who made trial of the elevated plateaux of the Andes was one in the first stage of consumption, who resided at a height of 6000 feet above the sea level in the mountains of Peru. Here he was quite free from cough, but he had some hæmoptysis. I do not, however, attribute this latter symptom directly to the mountain climate.

The great success of the sea voyages deserves a passing notice, and is somewhat opposed to the theories of Rochard,¹ who, because he found from statistics that, among the sailors of the French navy, which at that time cruised almost entirely in the torrid zone, phthisis was more common than among soldiers, concluded that sea voyages were of no use in the treatment of phthisis, but rather the reverse. If our patients had cruised only in hot climates, as the French sailors did, the voyages would probably have not been so beneficial, but this was not the case; the larger number made the trip to Australia and back, others travelled round the Cape to India and China, others to the West Indies, and some few went by steamer backwards and forwards between this country and the American Continent.

¹ 'Mémoires de l'Académie de Médecine,' t. xx, p. 103.

The nearly uniform good results cannot be assigned to equability of temperature, as the variety of climates and the boisterous weather encountered in many of them precludes such explanation. It may rather be assigned to the abundant supply of the constant change of fresh pure air, obtained with little or no fatigue, and to its well-marked effect on the appetite, both as to the kind of food and the amount digested, which, as Dr. Maclaren¹ truly remarks, is the first decided sign of amendment. The moral influence, too, of what is to many an entire change of life, acts often beneficially on the spirits of the patient, and assists, if proper care be paid to diet and cabin ventilation, in his recovery.

It may be remarked that our statistics, though they testify strongly in favour of dry climates, yet in the satisfactory results they yield from sea voyages, give evidence in favour of, at any rate, one very moist form of climate. Why great benefit should be derived both from sea voyages and also from residence in dry localities as took place in some of our cases when both were tried I do not pretend to explain, but would suggest that in both cases great purity of air was present.

Influence of climate on different forms of Consumption.

Do certain forms of consumption derive special benefit from any particular climate? The present cases are insufficient in number to decide this question in all its bearings, but only as regards consumption of *inflammatory* or *catarrhal* origin.

Of 55 patients, in whom the disease had a pneumonic, pleuro-pneumonic or pleuritic origin, 4 wintered once or oftener at Pau, 18 at Madeira, and 35 in the south of Europe.

Of the Pau patients all became decidedly worse, except one in whom the local condition remained stationary, while the general health became worse.

¹ 'British and Foreign Medical Review,' p. 193, January, 1871.

Of the Madeira patients in 18 or in 72 per cent. the general condition improved, and in 5 or 28 per cent. it deteriorated; the local results being more unfavorable, 11 improving and 7 getting worse.

Among the south of Europe cases the general health improved in 21 or in 60 per cent., remained stationary in 9 or in 26 per cent, and deteriorated in 5 or in 20 per cent. The local disease progressed in 17 (or about half), was stationary in 11, and advanced and extended in 7.

Thus putting aside Pau cases, which all did badly, the Madeira ones showed a percentage of "worse," both locally and generally, double that of the south of Europe patients.

Therefore, as far as the statistics go, and judging chiefly by the number of "worse," at Pau and Madeira, it would appear that *a warm and dry climate is more successful in the treatment of phthisis of inflammatory origin than a warm or cold moist one.*

Of 41 cases of phthisis of catarrhal origin 10 wintered at Pau, 9 at Madeira, and 21 in the south of Europe. Among the Pau patients the general condition improved in 5, and deteriorated in 5; the local condition improved in 4, remained stationary in 3, and became worse in 3. Among the Madeira patients the general condition improved in 8, and deteriorated in 1, while the local condition improved in 5, remained stationary in 3, and became worse in 1. Of the south of Europe cases there was general improvement in 16 instances, deterioration in 5; local improvement in 11, a stationary condition in 2, and advance and extension in 7; in one the local condition being unknown. According to these figures, the climate of Madeira seems to have answered by far the best, and that of Pau the worst, while the south of Europe occupied an intermediate position in fitness for this variety of the disease. The natural inference is, therefore, that *warmth and equability of climate are more important than dryness, for patients suffering from phthisis of catarrhal origin.*

Duration of life.

How long did the climate patients live, and was their span of life prolonged by their residence in foreign climes?

Of the 251 patients who passed on an average $2\frac{1}{2}$ winters abroad, 40 have died, and 202 were alive when last heard of. Among the deaths the average was 8 years exactly; among the living 8 years 11·21 months (nearly nine years).

Compare these averages with the results of 749 patients who never wintered abroad. Of these 149 have died, having lived on an average seven years seven and a half months, and 600 were living at last report, having lived on an average nearly eight years (7 years 11·15 months). Comparing the deaths of each class we find that there was an extension of $4\frac{1}{2}$ months in favour of the climate cases.

Far more striking was the result of observations on the effects of cod-liver oil in the duration of life; 40 patients took oil irregularly or not at all, and of these 17 have died; the average duration among these deaths being only four years eight and a half months, which contrasts strongly with the average of the total climate cases, viz. eight years. Yet at the commencement these 40 patients were not more unfavorable cases than the rest. At first sight the results of the duration of life in the home and foreign cases are not very encouraging for the latter, and make us question whether it was worth while to send patients abroad; but we must not forget that the unfavorable climates are included, and that a large preponderance of the winters were spent in them.

Even in the less favorable climates, the invalids enjoyed a great deal more out-door life than it would have been possible for them to do in England, and it is the knowledge of this that induces invalids to pass winter after winter abroad, often without hope of deriving permanent benefit from their exile.

In conclusion I may remark that the superiority of the dry bracing climates over the moist relaxing ones has long been recognised and acted upon by many physicians, but that the desertion of the latter has been attributed to the



caprice of fashion. It has been my endeavour to show that this is not so, and that the treatment of phthisis by dry climates is founded on well-ascertained results.

The length of this communication has prevented the introduction of suitable cases, which, however, has been rendered less necessary by the statistical details furnished. I venture to hope that the above results may assist, with those of Dr. Hermann Weber and others, in forming a foundation on which a scientific and practical system of climatic treatment for consumption may eventually be built.



AN ACCOUNT
OF SOME
RENAL CALCULI
OF UNUSUAL SHAPE
FOUND IN THE LEFT KIDNEY OF A WOMAN WHO DIED
OF CANCER OF THE UTERUS, ETC.

BY
JEREMIAH MCCARTHY, M.R.C.S.,
ASSISTANT-SURGEON TO THE LONDON HOSPITAL.

COMMUNICATED BY
T. B. CURLING, F.R.S., PRESIDENT.

Received April 9th—Read May 14th, 1873.

IN February, 1872, a woman was admitted into the London Hospital under the care of Mr. Couper for spontaneous fracture of the neck of the left femur, the result of cancer, which, originating in the uterus, had spread through the sacro-sciatic foramina and involved the soft structures round the left hip with the upper part of the left femur. She was moribund when admitted and there was nothing to attract attention specially to her kidneys, any pain that she complained of being very naturally referred to the disease of her uterus.

She died soon after her admission, and on making the

post-mortem examination I found the upper part of the pelvis filled with a cancerous mass which pressed upon, and obliterated her left ureter; on removing the left kidney, and making a section in the usual manner, I found the pelvis enormously distended, the medullary portion almost altogether absorbed, and the cortical substance the seat of acute suppurative nephritis. The upper part of the left ureter was occupied by a large conical mulberry calculus and the distended pelvis contained eleven calculi; the remarkable shape of which induces me to bring then under the notice of your society. (See Plate IV.)

The calculi all felt soft and greasy when first removed from the kidney and some greatly resembled biliary calculi. The projections on the surface of the large calculus were unusually acuminate, and the rest consisted of a central globular body with four or five prominent spines. In five the central mass was about the size of a black currant, and the spines were short and stunted. In the remaining six the central part was smaller and the spines longer and more tapering. Three had a very symmetrical tripod base with a single erect central spine. The other three had much the same general outline but with one or more additional and shorter spines. The pelvis of the right kidney contained a single oblong spiculated calculus which has been analysed for me by Dr. Tidy, assistant to the Lecturer on Chemistry at the London Hospital Medical College. The results of his analysis are as follows:

Moisture	.	.	.	9.55	per cent.
Oxalates	.	.	.	8.72	"
Lithates	.	.	.	34.8	"
Chlorine	.	.	.	3.22	"
Sulphuric acid	.	.	.	4.56	"
Phosphates	.	.	.	a trace	"
Fat and Cholesterine	.	.	.	36.56	"
Loss	.	.	.	2.59	"

100.00

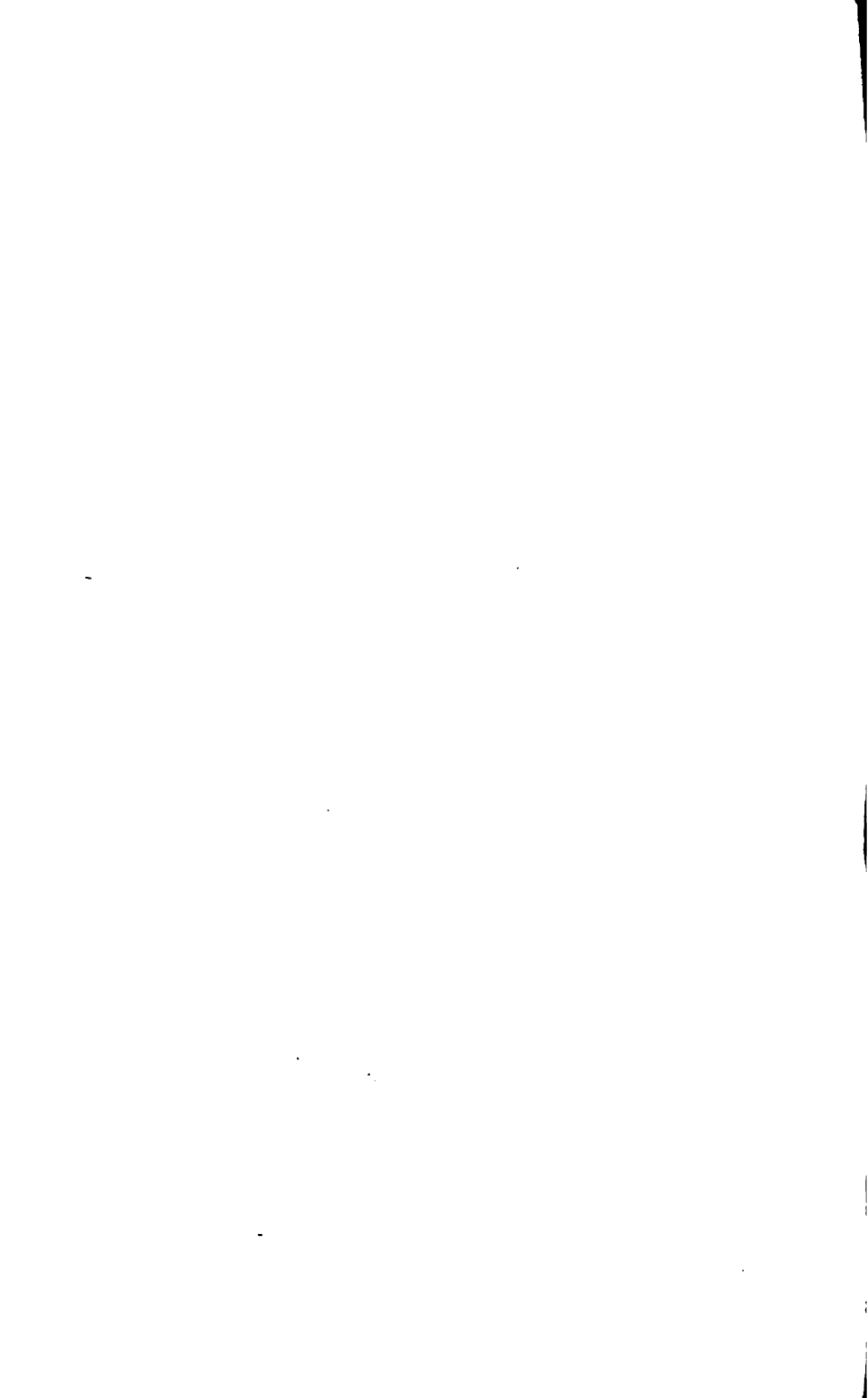
Mr. Curling has kindly informed me that there is a some-

what similar specimen of renal calculi in the museum of the Royal College of Surgeons. They are much smaller, with very fine and delicate spines. They are numbered c78 in the catalogue and are described as being composed of oxalate of lime. They were found in the kidney of a patient in whom the only noticeable feature during life was albuminuria. I cannot offer any explanation of the unusual shape of these calculi, which appear to be too symmetrical to have been formed accidentally.

DESCRIPTION OF PLATE IV.

Renal calculi described in the foregoing case.





ACCOUNT OF A CASE
OF
INTESTINAL OBSTRUCTION
IN WHICH
AN ARTIFICIAL ANUS WAS MADE IN THE SMALL
INTESTINE.
RECOVERY, AND SUBSEQUENT DEATH FROM CANCER AND
FATTY DEGENERATION OF THE HEART.

BY
JEREMIAH MCCARTHY, M.R.C.S.,
ASSISTANT-SURGEON TO THE LONDON HOSPITAL.

COMMUNICATED BY
T. B. CURLING, F.R.S., PRESIDENT.

Received April 9th—Read May 14th, 1873.

ON February 11th, 1872, I was summoned to the London Hospital to consider the propriety of operative interference in a case of intestinal obstruction in a man who had been admitted on the preceding evening on the medical side of the hospital.

The patient, æt. 52, a gardener by trade, stated that he had always enjoyed good health; that his father had died of obstruction of the bowels at a very advanced age, but that otherwise his family history was good; that he had been twice married, but had not any children by either wife, and that he had never contracted any venereal disease.

In November, 1871, he began to feel a sense of weight and discomfort after taking food, and to experience difficulty in

passing his motions. This latter trouble gradually increased to such a degree that he could only procure relief of his bowels by long continued straining over hot water, and had culminated a fortnight prior to his admission into hospital in complete cessation of natural motions. Having procured medical assistance he was given purgatives which always caused vomiting, and cathartic injections which at first brought away some fecal matter, but afterwards none whatever. Except after taking purgatives he had not any sickness or nausea. He further stated that he had been losing flesh rapidly during the last few months. Although he had not any stricture he was unable to make water; but the quantity of urine drawn off by a catheter was about normal.

His face had a pinched and anxious expression, his complexion was slightly jaundiced, his tongue foul, his abdomen tense, and everywhere resonant on percussion. The abdominal walls were so stretched, that the coils of distended intestine could be distinctly traced. He did not complain of any localised pain, but said that he felt sore and uncomfortable all over. By digital examination of the rectum I found that there was intense spasm of the sphincter muscles, and when this had been overcome I could feel that the upper part of the pelvis was occupied by a globular and very tense tumour which pressed upon the middle portion of the rectum. The passage of some flatus through a portion of this tumour while my finger was in contact with it, proved it to consist of some coils of small intestine probably forced down by the distension of the rest of the intestinal tube. With some difficulty I was able to pass a long tube for about three feet, but had to desist on account of the pain the patient experienced. When it was withdrawn there was not any trace of feces upon it.

This was all I could learn and discover about the case. It was clearly one of obstruction, and probably caused by some malignant growth, but there was no possibility of ascertaining the exact nature or position of it. Colotomy on the left side being out of the question, and the result of such an operation on the right side being altogether uncer-

tain, I had to choose between adopting medicinal treatment, making an artificial anus in the small intestine, or making a large opening into the peritoneum and tracing out the cause and seat of obstruction. Under these circumstances I consulted my colleague Mr. Maunder, and his opinion was that the case was favorable for operation, and that to open the small intestine in the right inguinal region would give the patient the best chance of relief.

The patient having given his consent I determined to adopt this course. I had intended to make an opening through the right linea semilunaris, but when about to do so found that there was at that part an intricate anastomosis of distended superficial veins which if divided would, probably, cause inconvenient hæmorrhage. I therefore made an incision in the skin about two inches below and to the right of the umbilicus downwards and outwards for about an inch and a half. The fasciæ and the anterior layer of the sheath of the rectus abdominis muscle were then divided on a director to an equal extent, and the fibres of the rectus muscle having been separated with the handle of the scalpel, the deep epigastric artery could be felt along the outer border of the incision. The posterior layer of the sheath of the rectus and the peritoneum were next divided for about three quarters of an inch. As soon as the peritoneum was opened a quantity of clear colourless fluid gushed out, and a small portion of the bowel bulged at the wound. This I secured with three sutures on either side to the margin of the wound, and then, having made a longitudinal incision in the bowel, I attached the cut edges to the integument by six fine silk sutures. A great deal of flatus and of dark semifluid fæces at once escaped and continued to do so for some hours. An opium suppository having been administered the patient was removed to bed. His subsequent course was one of uninterrupted recovery. On the morning after the operation he said he had not felt so comfortable for months. His tongue was cleaning rapidly, and he had not the slightest tenderness on pressure. His temperature was carefully taken for some weeks, night and morning, and never rose above 99°, usually

being exactly normal. He was ordered a grain of opium every four hours, and milk and beef tea, but his appetite being excellent and his general condition good, his diet was after the first two or three days changed to four eggs, six ounces of cooked meat, bread, a quart of milk, and a little brandy. As his bowels became relieved his difficulty in making water ceased.

The discharge from the artificial anus consisted of a semi-fluid, dark green pulp, very much resembling meconium. It varied occasionally in consistence, sometimes being much more fluid and frothy, especially if he drank beer, which, when he was in health, had a tendency to cause diarrhoea. It was altogether free from any offensive smell. The only difficulty experienced in the case was from the irritation of the surrounding skin, which was excoriated for some inches round the opening, but this was soon overcome by the application of powdered starch, and at the end of the fourth week the wound was soundly healed and the patient allowed to get up. Twice, subsequently to the operation, he passed motions by the rectum. He still continued to lose flesh, but not more than the confinement might perhaps account for. As the mucous membrane had a tendency to become everted whenever he stood up, an abdominal belt was ordered for him. On the forty-eighth day after the operation, having been in his usual health and spirits during the day, towards night he was suddenly attacked with faintness and died in half an hour.

The post-mortem examination proved that the obstruction had been caused by cancer which, originating in the cardiac end of the stomach, had involved the splenic flexure of the colon, which was so constricted as to barely admit the end of the little finger. The small intestine had been opened about eighteen inches from the cæcum, and there was not the slightest trace of peritonitis. The ascending and transverse portions of the colon were greatly distended and hypertrophied, and contained about two pints of bright yellow fluid fæces. The bowel below the constriction was empty, except for some scybala lodged in the upper part of the rectum. The peritoneum and pleura were everywhere

studded with small nodules of cancer much resembling miliary tubercle. The liver was the seat of numerous secondary deposits of cancer, which had apparently developed in the sheaths of the bile-ducts. The thoracic and abdominal lymphatic glands were also extensively diseased. The heart presented a well-marked example of fatty degeneration, and death had probably resulted from failure of its action.

Although cases where an artificial anus has been established for intestinal obstruction are by no means rare, and many such have been recorded in the 'Transactions' of this Society, I think that the present case presents some features of special importance. The first point to which I would call attention is the absence of peritonitis. Mr. Erichsen, in his 'Science and Art of Surgery,' states that "intense and frequently fatal peritonitis is the inevitable consequence of any such operation. That there was none in this case was due, I think, to the operation having been done as soon as possible, and before the symptoms had become extremely urgent, to the very slight disturbance of the bowel, and to the care taken to prevent the escape of any blood or fæces into the peritoneal sac. In all the already recorded cases where the small intestine has been opened in adults the operation appears to have been regarded as a forlorn hope, and to have been deferred until the patient's condition was desperate, to have been preceded by a long course of drastic purgatives, and to have been complicated by excessive disturbance of the viscera. May not, then, "inevitable" peritonitis be fairly regarded as the consequence not so much of the operation as of its having been too long deferred and of the preceding and accompanying conditions? Of course a single case forms but a slight basis on which to form such an opinion; but I am supported in it by what occurs in operations for strangulated hernia. It is, I think, generally admitted that the peritonitis which so frequently follows such operations in hospital practice depends not so much on the mode of operation, or the opening or not of the sac, as on the intensity or duration of the preceding strangulation.

The next point of interest in the case was the fact of there being very fluid but otherwise normal faecal matter in the portion of the bowel between the artificial anus and the obstruction. That it was so very fluid was probably due to the escape of the more solid portions through the opening in the small intestine. Had the obstacle been merely of a temporary character, which would have disappeared under medicinal treatment, the patient would have had to balance the relief experienced by the operation against the inconvenience of a faecal fistula which might have been closed at some future period; but as it was of a malignant character, which was certain to cause his death at no very distant period, it was clearly to his advantage that bile-containing faecal matter should pass into the large intestine, whence the bile could be reabsorbed and of such a consistence as would admit of its filtering slowly and painlessly through the constriction.

Again, it is noteworthy that the patient did recover from the operation, as Mr. Caesar Hawkins, in a most interesting paper on the subject in the thirty-fifth volume of the 'Transactions' of this Society, states "that there is no known instance of recovery after an artificial anus has been intentionally made in the small intestine except where there has been a protrusion of a hernia."

The relative merits of lumbar colotomy and of enterotomy have been long decided, and no surgeon would hesitate to prefer the former, where the seat of obstruction was known and the operation feasible. But I think that this case suggests the propriety of enterotomy at an early period in cases of obstruction where the cause and position are unknown, or where both being known there is reasonable probability of a second obstruction higher up in the alimentary canal.

I cannot conclude this paper without expressing my great obligation to Mr. Maunder for his kind advice, encouragement, and assistance, by which I was induced to undertake an operation which, from what has been heretofore written on the subject, I should have felt great hesitation in performing.

— 10 —



ON THE
PATHOLOGY OF THE MORBID STATE
COMMONLY CALLED
CHRONIC BRIGHT'S DISEASE WITH
CONTRACTED KIDNEY.
("ARTERIO-CAPILLARY FIBROSIS.")

BY
SIR WILLIAM W. GULL, BART., M.D., D.C.L., F.R.S.,
AND
HENRY G. SUTTON, M.B., F.R.C.P.

(Received April 9th—Read May 28th, 1872.)

DR. BRIGHT and subsequent pathologists have fully recognised that the granular contracted kidney is usually associated with morbid changes in other organs of the body. The disease in the kidney and the coexistent morbid changes are commonly grouped together and collectively termed "chronic Bright's disease."

In this communication we propose to consider the pathology of this morbid condition. We are induced to do this because our observations tend to show that the present prevailing pathological theories do not fully comprehend the whole history of the disease.

It is, we believe, generally assumed that the kidney is the organ primarily affected, and in consequence a cachexia is induced through which other organs subsequently suffer and

undergo chronic changes. How far this opinion is well founded we now proceed to examine.

It will be advantageous first to consider the morbid changes in the kidneys, and subsequently the morbid changes which occur in other parts of the body.

The morbid anatomy of granular contraction of the kidney is generally so well known that it is needless here to fully describe it, though it is necessary to recount some of the histological changes which may be observed in this state.

For our examinations some sections were made of the diseased kidneys without any hardening process; others were made after freezing: some sections were faintly stained by a weak solution of nitrate of silver, others by carmine, and others were left in a natural state. The examination was made by $\frac{1}{4}$ and $\frac{1}{8}$ inch object-glass, and the following changes were noticed.

A fine fibroid or hyalin-fibroid substance was seen between the convoluted tubules, which made the tubules appear wider apart than normal. —

In some parts this substance had a homogeneous appearance, in others it had a striated or fibroid appearance like a network, and contained minute indistinct nuclei, (?) and in others it had a coarser and more defined fibre-like character. This substance was seen in considerable quantity round the Malpighian bodies, and in still greater amount in and around the walls of the minute arteries. In some renal arterioles injected with Beale's blue translucent fluid the elastic tissue of the tunica intima was normal. The muscular tissue appeared to be changed in some of the vessels—it seemed thicker than natural, particularly when the arterioles were viewed longitudinally. The muscular nuclei were indistinct, and many of them were so altered as hardly to be recognisable. External to the muscular nuclei, there was a quantity of hyalin-fibroid substance, and the layer formed by this material was much thicker than the muscular layer (Plate VI, fig. 7). This hyalin-fibroid was in some of the arterioles bounded externally by a few coarser fibres, in some it merged imperceptibly into the fibroid tissues lying between the

tubules. The arterioles were often very much thickened and tortuous. The lumen of some of them was encroached upon and narrowed, and in some it seemed completely obliterated. The morbid material here alluded to had in and around the walls of some of the arterioles very little hyaline appearance, but was more coarsely fibrous. Many of the convoluted tubules were not appreciably altered except that their epithelium was more or less granular. Others were much shrunken and wasted. Here and there a quantity of the fibroid material was noticed, arranged in a concentric manner; and in the centre of the coil were a few indistinct, shrivelled, scarcely recognisable, epithelial cells. These fibroid coils apparently enclosed atrophied tubules. Some of the tubules were irregularly dilated, or apparently formed a number of cysts. In some situations, almost all trace of tubular structure had disappeared, and scarcely anything but fibroid tissue remained. When the cortex was very much contracted the Malpighian bodies were found lying very much closer together than normal, and surrounded by a considerable quantity of fibroid tissue (see Plate V, fig. 1).

In an early stage of granular contraction of kidney, when there are no changes appreciable to the naked eye, except that the surface of the kidney is as technically called in the post-mortem room "coarse," the following alterations may be observed. In the walls of some of the minute arteries and also outside and around them, there appears to be an excess of fibroid tissue, and the arteries in consequence seem thicker than normal. The number of arterioles thus affected varies very much. Those most altered are in the cortical parts. In making this observation we are well aware that there is normally more or less of areolar tissue around the minute renal arteries, therefore it is difficult with any degree of certainty to appreciate any slight increase in such tissue, but after careful observation it seemed to us that the outer coats of the arterioles even at this early stage were thickened by increase of fibroid tissue. The muscular tissue did not appear increased. The intertubular tissue seemed also altered in some parts. It was abnormally distinct

and clearly defined. The fibre-like appearance was unduly marked as contrasted with the normal kidney intertubular structure. Immediately under the capsule and corresponding to the depressions of the granular surface, fibroid tissue extended inwards, obscuring and destroying the tubular structure. This appearance has been well described by Dr. Dickinson. Amongst this fibroid tissue we occasionally observed a number of corpuscles and nuclei.

It remains for us to describe the morbid changes in the epithelium of the convoluted tubules. Dr. Johnson, p. 219, 1st edition of his work on 'Kidney Diseases,' states that in the early stage of the disease now under discussion the only deviation from the usual appearance is in the epithelial cells of the convoluted tubules. "The epithelial cells are," he says, "opaque and have an unusual, finely granular appearance; in some of the tubules there is an appearance as of entire cells having been shed filling the tubules and rendering them opaque; in others there is an equal filling and opacity of the tubules from contained epithelium in a disintegrated condition." Dr. Dickinson states, on the contrary, that in the early stage of granular renal disease the epithelium is as in healthy kidneys, but it is altered where the kidneys are greatly contracted. We also ourselves have observed in some specimens that the epithelium cells were finely granular, but natural in all other respects. In others we have noticed a quantity of granular or homogeneous matter that rendered the tubules more opaque and almost completely concealed the epithelium. In the advanced stages of granular disease the cells were very irregular in shape and shrivelled, their nuclei were indistinct. In some spots the epithelial cells were absent, and in other tubules of the same specimen the epithelium was observed to be not appreciably altered.

In the kidneys which had recently been the seat of acute nephritis the epithelium was more opaque and contained granules. Here and there only was an epithelium cell in its natural position, the rest of the tubule being denuded, or the cells concealed by granular matter.

From the descriptions given it would appear that Dr.

Johnson, Dr. Dickinson, and ourselves have observed similar changes in the epithelium. From these appearances Dr. Johnson draws the conclusion that the secreting cells of the kidney have undergone a primary pathological change. He refers this change in the cells to their removing from the blood some poisonous materials with which it is charged, and so becoming themselves changed in appearance and structure. We submit that it is not necessary to adopt Dr. Johnson's explanation in order to account for these appearances and alterations in the epithelium. The granular appearance of the epithelium is by no means confined to Bright's disease. It is usual to find it in kidneys which present no sign of disease except merely mechanical venous congestion. This form of congestion is seen more or less in by far the majority of post-mortem examinations. It occurs after death from various causes, and it is certainly not dependent on any definite pathological state beyond that of venous obstruction, which notoriously always takes place to a greater or less extent during the process of dying:—in consequence of obstruction to the circulation through the right side of the heart the blood accumulates in the vena cava and in the renal and other veins; the renal venules and capillaries become distended, and serum with albumino-fibrinous contents transudes into the tubules, the urine becomes albuminous, and the epithelial cells are coated with granular fibrinous matter. This exudation may be moulded in the tubules, and form hyaline or other casts, which may be retained in the tubules or passed in the urine.¹ Kidney epithelium may also be shed as the epithelial cells of the bladder may soak off during or after death. Urine contained in the bladder is notoriously commonly albuminous after death, and charged with columnar and other epithelium. In such cases there is often no evidence of kidney or bladder disease. It appears to us, therefore, that Dr. Johnson has attached undue importance to these slight changes in the epithelial tissue, whilst the greater

¹ Recent observations on the minute anatomy of the kidney raise a doubt whether casts formed in the convoluted tubercles of the cortex can escape from them.

changes which are seen in the advanced stage of the granular renal disease may be regarded rather as a consequence than as a cause of the atrophy of the kidney tubules. Our observations, on the contrary, seem to show that the visible morbid changes in granular contracted kidneys are due to the primary formation of "fibroid" or "hyalin-fibroid" substance in the intertubular parts, including the vessels, and to atrophy of the tubular and intra-tubular structures of the kidney.

This formation commences in different parts of the kidney, commonly near the surface, but it also seems to us to commence in the outer coats of the arterioles and in the walls of the capillary vessels. From these parts it extends round the convoluted tubes and Malpighian bodies. This fibroid or hyalin-fibroid substance subsequently contracts and draws the Malpighian bodies together, compresses the urinary tubules and vessels, and may entirely obliterate them.¹ This thickening of the capillary walls and the diminished calibre of some of the arterioles must naturally interfere with the nutrition of the tissues, and tend to produce further atrophy. Owing to these changes in the capillaries and arterioles the quantity of blood passing to the secreting cells would be lessened, and in consequence diminished activity in the secreting function would occur and promote atrophy even in normal epithelium.

We would not, however, maintain that the changes in the epithelium must be entirely secondary, for changes may be going on in it coincident with the hyalin-fibroid formation in the vessels.

Where the kidney disease was far advanced hyalin-fibroid changes were seen in the minute renal arteries precisely similar to those observed in the arterioles of the pia mater and of other parts of the body. Where the kidney disease was in an early stage the tissue around the arterioles of the kidney and between the tubules had a sharply defined, somewhat distinctive appearance. We have observed a similar appearance in the minute arteries of the pia mater.

¹ See Plate V, fig. 1.

Our examinations have shown us that this hyalin-fibroid formation commences, as regards the pia mater, in the outer coats of the arterioles and in the walls of the capillaries themselves; and observing that the same kind of formation occurs in the arterioles and capillaries of the kidney, we are led to infer that this change begins in the kidney as in the pia mater in the walls of the arterioles and capillaries, and subsequently extends to the surrounding structures.

We have now to consider the other pathological changes which make up the morbid condition known as chronic Bright's disease with contracted kidneys.

Of these the most important and, as we think, essential and primary are the changes in the vascular system, more or less general throughout the body.

Dr. Bright and subsequent observers have recognised that arterial changes are part and parcel of this state.

Dr. George Johnson in his work on 'Diseases of the Kidneys,' published in 1852, says that the walls of the minute renal arteries are usually much thickened, and that this is due to hypertrophy of their muscular layer.

Dr. Wilks, in the 'Guy's Hospital Reports,' published in 1853, remarks that the occurrence of diseased arteries in the chronic form of Bright's disease is well known. It is necessary we should state that both he and Dr. Bright referred to atheromatous changes, and to the thickening which occurs in the larger and moderate-sized arteries to changes in arteries visible, in fact, to the naked eye. Many other writers have made the same observations, but it is notorious that atheroma is common in the large vessels, not only in Bright's disease, but in other maladies; still there can be no doubt that it is exceedingly common in granular degeneration of the kidneys. Dr. Dickinson found it in the proportion of 52 per cent. Dr. George Johnson a few years ago showed that not only were the microscopical arteries of the kidneys thickened, but that the minute arteries of the skin and other parts of the body were similarly changed, and he attributed the change to hypertrophy of their muscular tissue.

Our observations confirm the opinion that the minute

arteries are thickened in chronic Bright's disease, and we gladly acknowledge the debt the science of medicine owes to Dr. George Johnson in so distinctly insisting upon the fact.

Dr. Beale has also confirmed the accuracy of Dr. Johnson's observations as regards the thickening of the minute renal arteries, and he expressed an opinion that this is due not to hypertrophy of the muscular layer of the vessel, and he has stated that the outer layer of these vessels is thickened.

We have examined by aid of the microscope a large number of vessels taken from bodies in which there was more or less chronic disease of the kidneys, chiefly granular degeneration, and we now desire to bring the result of our observations under the consideration of the Society.

For the purposes of such examination we chiefly selected the vessels of the pia mater, since they offered the greatest facilities for our purpose, and most of the descriptions of the vessels and the measurements mentioned herein have therefore reference to the minute arteries of the pia mater. In a few specimens the arteries were injected, but the major part were in the natural state, or merely stained. The portions of pia mater were usually taken from the under surface of the cerebrum where the membrane is thin. Afterwards the specimens were stained in carmine, and subsequently mounted in glycerine and camphor water. The vessels were then examined by $\frac{1}{4}$ - or $\frac{1}{8}$ -inch object-glass, and a first or second eye-piece. The outlines of some of the arterioles of each specimen were drawn by means of the camera lucida, and measured by a scale divided for the sake of convenience into $\frac{1}{40000}$ parts of an inch. This scale was adopted because it allowed of the estimation of minute differences.

It will be useful if we here mention that we generally found in the arterioles measuring about $\frac{1}{40000}$ part of an inch in diameter, that the lumen of the vessel was about twice as great as the thickness of its wall: i.e. on observing the vessel through the microscope, we found the thickness of its two sides or walls was equal to the lumen.

In the larger arterioles the relative width of walls and lumen was different, the lumen being proportionately larger.

In nearly all the cases from which the diseased vessels were taken the kidneys were more or less granular, and some much contracted. In a few cases only were the kidneys large, white, and mottled. The condition of the viscera is briefly given in the report of the cases, the details of which are recorded in the appendix to this paper.

The large arteries are usually not much thickened in chronic Bright's disease, but occasionally their outer layer is indurated and thickened by this fibroid substance. The greatest amount of thickening occurs in the coats of the arterioles and capillaries.

The outer layer of the arteries, measuring about $\frac{1}{1000}$ of an inch in diameter, are also not unfrequently thicker than natural. The degree in which the affected vessels are altered, and the extent to which the morbid change is diffused over the vascular system of the different organs, varies very much in different cases. In some, almost all the arterioles seemed more or less affected, in others, only an arteriole here and there, the remaining vessels not being greatly, if at all, altered, though frequently their outline is more clearly and sharply defined than natural. A practised eye can usually recognise this early stage of change by this sharply defined outline. In consequence of the occasional limitation of the morbid change to a few arterioles, care is requisite in making an examination or the diseased vessels may easily be overlooked.

The morbid change in an affected vessel is by no means necessarily uniform throughout its length, and may not extend to the branches it gives off. The lumen of the affected arterioles is sometimes distinctly lessened and the diseased vessels are not unfrequently tortuous, whilst in the walls of some of the minuter ones it is common to find groups of fat-granules aggregated together. The morbid changes vary according to the size of the vessels affected. In the larger ones, in which the three coats are distinct, the inner layer (tunica intima) is sometimes thickened to a marked degree. When this happens the elastic tissue is seen to form the inner edge of the arterial wall, and outside this the tunica intima has a fine fibrous or molecular appearance.

The muscular coat is also variously altered. Thus where seemingly normal, if placed, as fresh as possible, in a strong solution of carmine for about twelve hours, the nuclei do not absorb the carmine so readily as in healthy vessels. This is a very distinct difference. The muscular layer seems also often relatively increased. This appearance is, however, to us equivocal, for with this apparent increase it is common to find, even in the same vessel, the muscular tissue wasted, and the nuclei irregular in shape, or reduced to small globular bodies, having the appearance of large fat-granules. The muscular coat may be, in fact, degenerated into granular matter at one part, whilst in a contiguous portion of the vessel, it may seem to be relatively increased. The examination of this point which refers to the change in the muscular coat has much occupied our attention, but we have failed to discover evidence of the muscular hypertrophy so much insisted upon by Dr. George Johnson. Outside the muscular coat the morbid changes, to which we have already referred when describing the changes in the kidney, are well marked in the diseased vessels. The outer portion of the altered arterioles, as seen under the microscope, is commonly bounded by a few well-defined fibres of white fibrous tissue, within which, and immediately in contact with the muscular layer, there is a more or less homogeneous hyalin formation. Where this hyalin substance is in contact with the fibrous outer layer it has a fibrous appearance (see Pl. V, fig. 4). The general aspect of the affected vessels might give, as Dr. G. Johnson affirms, an appearance of true hypertrophy, but after full examination it seems to us the whole is due to a morbid process, and not to an increase of normal nutrition, this morbid process giving rise to the formation of the hyalin-fibroid substance we have described. In the otherwise homogeneous hyalin substance, ill-defined nuclei or corpuscles are often seen. These corpuscles cannot, when fully examined, be mistaken for normal muscle nuclei, since they are irregularly disposed in the tissue, and wanting in that definition characteristic of normal elements. Although in the more characteristically affected vessels the "hyalin" substance is, as stated, more

or less homogeneous, still this is by no means uniform, for not only may it contain the bodies just referred to, but it may itself be more or less replaced by coarse fibroid and granular material.

The change from the "hyalin" to the "fibroid" character is probably due to slowness of formation, as it is more common in aged persons. It is to be stated that the fibroid changes do not occur in the smallest of the capillary arterioles. In these the homogeneous or nearly homogeneous "hyalin" change alone occurs.

The morbid appearances here described were chiefly studied in the minute arteries and larger capillaries of the pia mater, but, as we have said, the same may be seen in the arterioles of the kidneys, and, we may now add, of the skin, of the stomach, of the spleen, lungs, heart, retina, &c.¹

In the arterioles of the spleen and lungs the morbid substance was more coarsely fibroid, and the pure hyalin change less distinct.

In reference to the seat of the hyalin-fibroid formation, we cannot pass over the question which will probably be raised by those histologists who believe in the existence of perivascular sheaths of the minuter vessels. On the existence of such canals we express no opinion, but assert only that the morbid changes we have noticed occur chiefly outside the muscular layer.

The following is a general summary of our microscopical observations:—

1. That the arterioles throughout the body in that condition usually called chronic Bright's disease with contracted kidney, are more or less altered.

2. That this alteration is due to a "hyalin-fibroid" formation in the walls of the minute arteries, and a "hyalin-granular" change in the corresponding capillaries (see Pl. VI, figs. 1, 2).

3. That this change occurs chiefly outside the muscular layer, but also in the tunica intima of some arterioles.

4. That the degree in which the affected vessels are

¹ Plate V, fig. 2; Plate VI, fig. 1.

altered, and the extent to which the morbid change is diffused over the vascular system of the different organs, varies much in different cases.

5. That the muscular layer of the affected vessels is often atrophied in a variable degree (see Pl. VI, fig. 3).

In order to ascertain the extent to which this change in the vessels existed, the pia mater was examined in a large number of cases of persons who had died of various diseases. Fifty-five cases were thus examined, and the result is found in the appendix given, and shows that this "hyalin-fibroid" change was associated with granular contraction of the kidneys in most of the cases; but, in some few, the vessels of the pia mater had largely undergone this change; and the heart was hypertrophied, whilst the kidneys remained healthy.¹

These examinations also showed that, in some cases, a few only of the minute arteries and capillaries were thickened, the left ventricle of the heart slightly dilated, whilst the kidneys were a little contracted in some of these cases, but in others not.²

We have further to state, that this "hyalin-fibroid" change was not found in the vessels of healthy persons, who had been accidentally killed, nor in ordinary phthisis, nor in other diseases whose morbid conditions are not allied to the cachexia of so-called chronic Bright's disease with contracted kidneys.³

It is now to be asked, What is the morbid condition antecedent to the changes in the minute arteries and capillaries? Dr. George Johnson considers that an impure state of the blood induces this vascular change. In order that we may not do his opinion any injustice, it will be well to quote his own words. He says, "In consequence of the degeneration of the kidney the blood is morbidly changed. It contains urinary excreta, and it is deficient of some of its

¹ See Appendix, Cases 2 and 3.

² See Cases in the Appendix, Nos. 26 to 35.

³ See particulars of cases given in the Appendix, Nos. 36 to 55.

own normal constituents. It is, therefore, more or less unsuited to nourish the tissues, more or less noxious to them. The minute arteries throughout the body resist the passage of this abnormal blood. The left ventricle, therefore, makes an increased effort to drive on the blood. The result of this antagonism of forces is that the muscular walls of the arteries and those of the left ventricle of the heart become simultaneously and in an equal degree hypertrophied. The persistent over action of the muscular tissues, both cardiac and arterial, is registered after death in a conspicuous and unmistakable hypertrophy."

This theory does not appear to us supported by the facts.

Dr. George Johnson states that the change in the minute arteries is simply hypertrophy of the muscular coat. But our examinations show that they are thickened by a "hyalin-fibroid formation," and that in fact the muscular coat is often variously atrophied.

Thus, Dr. George Johnson regards the changes in the heart and arterioles in chronic Bright's disease as a physiological result, due to a morbid change in the blood, whilst our observations lead us to regard the cardio-vascular changes as throughout a morbid one.

Further, extreme degeneration of the kidneys, and together with this, no doubt, a noxious state of the blood, to which Dr. Johnson attributes the vascular change, may be present, and the vessels may frequently be found healthy. In support of this statement we have recorded in the appendix cases of large white kidneys, and of scrofulous pyelitis,¹ in which the kidneys were much diseased, and the renal changes were chronic attended with general œdema and uræmic symptoms, and the vessels were healthy. Dr. George Johnson and other pathologists regard, as we have said, the general vascular changes as essentially consecutive to antecedent renal disease, but our inquiries show that these changes are, or may be, independent of renal disease, and that the renal change in chronic Bright's disease with contracted kidney, when present, is but a part of a general morbid condition.

¹ See Appendix, Cases 56 to 60.

We are led to conclude that the kidney disease does not give rise to the vascular change. Our investigations show the disease under the following forms:

(1) Kidneys often much contracted, heart much hypertrophied, minute arteries and capillaries proportionately thickened by "hyalin-fibroid" formation.¹

(2) Kidneys little contracted, but heart much hypertrophied, minute arteries and capillaries much thickened by "hyalin-fibroid" substance.²

(3) Kidneys healthy, whilst heart much hypertrophied and minute arteries and capillaries much thickened by "hyalin-fibroid" substance.³

These facts show that there is a morbid state in which the kidneys are contracted, the heart hypertrophied, and the minute arteries and capillaries altered by a "hyalin-fibroid" formation. Further that the kidney changes are often, but not always, a part and parcel of this morbid state. The absence of such lesions of the kidneys proves that they do not constitute an essential and indispensable part of the general process.

We have already mentioned that the granular contracted condition of the kidney is dependent on a "hyalin-fibroid" formation in its arteries and other structures. The same kind of morbid change, in fact, occurs in the contracted kidneys as occurs in the arteries and capillaries of the pia mater, of the skin, of the heart, of the stomach, and other parts. The kidney disease would, therefore, seem to be but a part but not an invariable part of the "hyalin-fibroid" change, but as the vascular system was at some part affected with this change in all the cases, we regard such vascular change as the constant and essential part of this morbid state.

We have next to consider the pathology of another morbid condition which forms part of the state known as chronic Bright's disease. We refer to hypertrophy of the

¹ See Appendix, Cases 1, 4, 6, 8, 15, 21.

² See Appendix, Cases 7, 10, 20.

³ See Appendix, Cases 2, 3, 19.

left ventricle of the heart unaccompanied by any valvular defect or adhesion of the pericardium.

The morbid appearances of this hypertrophy are so well known that it is not requisite for us here to describe them, but it is necessary we should state that we have found the minute arteries in the walls of the heart much thickened by the formation of "hyalin-fibroid" substance already described.¹

Bright, to account for this hypertrophy, says: "The most ready explanation appears to be that the quality of the blood is altered by the kidney disease. The blood in consequence affects the minute and capillary circulation so as to render greater action necessary to force it through the vascular system." Many pathologists have adopted this explanation. Dr. Wilks, however (see 'Guy's Hospital Reports' for the year 1858), has suggested that the hypertrophy may be dependent on atheromatous changes in the vessels.

They who adopt the explanation given by Bright state in support of their opinion, that the hypertrophy of the heart and the renal disease are so frequently associated together as to show that there is some intimate relation between them. They further state that this hypertrophy occurs in all forms of chronic kidney disease; and therefore they conclude that it is consequent upon diminished excretory power of the kidney.

Dr. Johnson, who supports this opinion, further states that physiologists have demonstrated that impure blood circulates with great difficulty and creates an impediment.

There is, however, evidence on the other hand which appears to be strongly opposed to these views.

Thus the cardiac hypertrophy and the renal disease are no doubt frequently associated, as we have said; but this does not prove that there is a relation of cause and effect between the two states; for it is evident that both these morbid conditions may be dependent on a third more general one. Moreover, against this commonly accepted explanation it can be shown that in many cases of chronic kidney disease

¹ Plate V, fig. 6.

the heart is not hypertrophied. Dr. Wilks has mentioned to us that in many cases of large white kidney he has found the heart free from hypertrophy. Dr. Dickinson states that simple hypertrophy of the left ventricle is rarely associated with any form of renal disease excepting granular degeneration.

We have post-mortem records of seventeen cases of large white kidneys, and in twelve of them the heart was healthy. Dr. Grainger Stewart found in lardaceous disease of the kidney that the heart was hypertrophied in only four per cent. of the cases. In four cases, in which the kidneys were almost destroyed by scrofulous pyelitis, we found the heart healthy.

We have particulars of nine cases in which the kidneys were very contracted and the heart was free from hypertrophy.

In these various forms of kidney disease the morbid changes were chronic, and it must be supposed that the blood was altered. The morbid conditions to which the hypertrophy is attributed were, therefore, present, but the heart, at the same time remaining healthy, shows that these renal and blood changes are not sufficient to produce hypertrophy, and indicates that when present it is due to some other condition.

In some of our cases, it is true, the kidneys were large, white, and mottled, and the heart was hypertrophied, but besides the renal affection the vessels in these cases were much diseased by the "hyalin-fibroid" formation.

We attribute the hypertrophy to the vascular change.

Dr. George Johnson explains the occasional absence of hypertrophy in cases of chronic Bright's disease by assuming that the muscular tissue of the heart is imperfectly nourished in such cases. In considering this suggestion it is necessary to bear in mind that, if the blood be altered, and the circulation in consequence impeded, the left ventricle of the heart must contract with greater force than natural to overcome the impediment. To accomplish this it must acquire increased strength:—become hypertrophied; or it would be unable to overcome the obstruction, and the ven-

tricle then being unable to empty itself completely, would in consequence become dilated.

Dr. Johnson may in this manner explain disproportionate dilatation, but does not explain how a normal-sized heart acquires the additional force requisite to overcome the supposed obstruction.

Experience has fully shown that hypertrophy of the left ventricle occurs much more frequently with granular contracted kidneys than with any other form of renal disease; and our observations, supported by the particulars given, appear to show that in this form of kidney disease the hypertrophy is not induced by the renal affection, but by a morbid change in the minute arteries and capillaries. Of 34 cases in which the kidneys were healthy, excepting that they were slightly granular, or in other words "coarse," and contained some cysts, the left ventricle was hypertrophied in 18; and there was no valvular disease or pericardial adhesion to account for the hypertrophy. In these 18 cases the hypertrophy would appear to have been the older and preceding condition.

Niemeyer states¹ that Bamberger, arguing against the view that cardiac hypertrophy is dependent upon the renal disease, has shown that it begins in the earlier stages of Bright's disease. Observing, therefore, that this cardiac hypertrophy occurs not unfrequently in the very early period of the kidney affection, when the excretory function is not greatly altered; and further observing that the heart in some cases is not hypertrophied, when the kidneys are very much contracted, and the function of excretion is of necessity greatly altered, we also again conclude that the hypertrophy is not dependent on the kidney change.

The following particulars seem in fine to indicate that the hypertrophy is induced as we believe by the morbid changes in the vessels.

The heart was found (see cases in the appendix) hypertrophied in all the cases in which the vessels were much and

¹ 'Text-book of Practical Medicine,' vol. i, p. 300.

generally thickened by the "hyalin-fibroid" change:—the heart was found slightly hypertrophied where the vessels were a little thickened, or a few of them only were thickened by this "hyalin-fibroid" material; the heart was much hypertrophied when the vessels were much thickened and there was no kidney or other disease, except this vascular change adequate to account for it.

Nor is it difficult to explain how the vascular disease gives rise to the cardiac hypertrophy.

The "hyalin-fibroid" material in the walls of the arterioles must be an impediment to elasticity, and it can be experimentally shown that greater force is required to propel a fluid continuously through a non-elastic than through an elastic tube. The left ventricle, therefore, owing to this diminished elasticity of the arterial walls, has of necessity to contract with greater force to carry on the circulation.

It remains to briefly notice a few other morbid conditions which form part of the pathological changes known as chronic Bright's disease with contracted kidneys.

The first is vesicular emphysema. It is well known that vesicular emphysema and granular contracted kidneys frequently coexist. Of 33 cases of persons about middle age in which the lungs were emphysematous, the kidneys were more or less granular, and contracted in 22; and there were no changes in the lungs to show that such emphysema was compensatory. In some of the cases the emphysema was great whilst the kidneys were only slightly granular; in other cases the kidneys were much contracted, whilst the lungs were comparatively little diseased, which facts seemingly show that the emphysema may precede the kidney contraction, or the kidney disease may occur antecedent to the lung disease; and this is fully borne out by clinical experience. We have not as yet had an opportunity of examining microscopically the vessels of a number of emphysematous lungs associated with contracted kidneys, but in a few such lungs we have found the vessels surrounded by what seemed to be an unusual quantity of fibroid tissue, and it is common to see without the aid of the microscope

the connective tissue increased around the vessels and tubes in these emphysematous lungs.

With granular contracted kidney we have also found the aorta and aortic valves much diseased and the seat of atheromatous and sometimes calcareous changes giving rise to dilatation of the aorta with or without aortic obstruction and regurgitation.

Another morbid condition to be noticed is so-called "retinitis albuminurica," which experience has shown to be frequently associated with granular contracted kidney. In this change of the retina there is sclerosis of the connective tissue. There is also sclerosis and fatty degeneration of the coats of the blood-vessels, and the vessels have been found greatly narrowed and even obliterated. These morbid changes in some cases lead to atrophy of the optic disc and of the retina.¹ The tunica adventitia of the larger retinal vessels is often considerably increased in thickness. Mr. Bader in describing these diseased vessels says,² "Sclerosis is seen in the coats of the blood-vessels, especially of the small arteries and capillaries of the retina and choroid. Their walls are thickened through a homogeneous, strongly reflecting, not quite transparent substance.

From the description given it would seem, therefore, that the morbid appearances observed in these retinal vessels were similar to those we have observed in the arterioles and capillaries of the pia mater, kidneys, and other parts.

The spleen has been found by us in instances of chronic Bright's disease: diminished in size; in some cases weighing only two or three ounces, and in some no more than one ounce and a half: capsule thickened: on section substance tougher than natural, but the most noticeable alteration was the increased quantity of fibrous tissue: under the microscope the vessels were seen surrounded by a much larger quantity of fibroid tissue than usual, and in the outer coats of some of the minute arteries, "hyalin-fibroid." changes were obvious, and similar to such as occur in the

¹ See Mr. Soelberg Wells' 'Treatise on Diseases of the Eye,' p. 358.

² See 'Guy's Hospital Reports,' 1866.

arteries of the kidney and pia mater. In some cases where the kidneys were greatly contracted the spleen was very much affected in the manner described, but in some cases the spleen was much wasted, and the kidneys were little contracted; in other cases the spleen was very little wasted, whilst the kidneys were very much contracted.

We also found in many instances of granular kidney disease that the convolutions of the brain were much wasted, whilst the minute arteries of the pia mater were thickened by "hyalin-fibroid" substance. In other cases of contracted kidneys, in which the brain was healthy, no "hyalin-fibroid" changes were found in the vessels of the pia mater. In a few cases the convolutions of the brain were wasted, and the vessels of the pia mater were thickened by this "hyalin-fibroid" change, whilst the kidney and heart were healthy, showing the independence of this change of heart or kidney.

Fibroid changes with atrophy have also been observed by Drs. Fenwick and Wilson Fox in the intertubular portions of the stomach in chronic Bright's disease. The arterioles of the stomach have been found thickened. We have also observed in chronic Bright's disease with contracted kidneys great fibroid thickening in the walls of the minute arteries of the stomach and fibroid changes in the intertubular parts.

The clinical history of this morbid state enables us to get clearer views of its pathology. Old age is not an entity, but it is pre-eminently a condition or set of conditions predisposing to that state which is called chronic Bright's disease with contracted kidneys. To demonstrate the extent to which man in different periods of his life is exposed to granular degeneration of the kidney, we have collected from post-mortem registers particulars of 336 cases, death being due to various diseases. These cases were grouped according to the age. The following is the proportion of granular degeneration of the kidneys, and the proportion of granular to healthy kidneys in each decennial period of life.

From the age of	The total number of deaths from all causes.	The number of those cases in which the kidneys had undergone granular degeneration.	The proportion of granular to healthy kidneys in each decennial period of life.
10—20 years.....	44	1	1 granular kidney in 44 healthy ones.
20—30 „	69	2	1 ditto in 34 ditto.
30—40 „	84	10	1 ditto in 8·4 ditto.
40—50 „	82	81	1 ditto in 2·6 ditto.
50—60 „	39	28	1 ditto in 2·3 ditto.
60—70 „	13	12	1 ditto in 1·08 ditto.
70—80 „	5	4	1 ditto in 1·2 ditto.

It here appears that after the age of forty a large proportion of persons who die of various diseases have more or less granular contraction of the kidneys as shown on the surface of these organs; and it further appears that after forty years of life granular degeneration greatly increases as age advances.

Granular degeneration of the kidneys, therefore, belongs principally to the period of life at or over forty years of age.

Dr. Dickinson shows that of 308 persons with granular kidney only 75 died before forty years and 233 after forty years of age. It is evident, therefore, that chronic Bright's disease with granular kidney is allied with the conditions of age and experience shows that it is caused by all those influences which are recognised as tending to bring about senile changes whether prematurely or not.

Children are occasionally the subject of granular contracted kidney, and there is given in the appendix to this paper the case of a girl, aged 9 years, in whom occurred granular and very contracted kidneys, hypertrophied heart, and very thick "hyalin-fibroid" arterioles.

We here mention that occasionally in young subjects not

over twenty years of age the kidneys may undergo extreme contraction and degeneration, and be apparently strictly a local affection, and death may occur from the so-called uræmic poisoning without any signs of the cardio-vascular changes characteristic of chronic Bright's disease with contracted kidneys of a later age. These cases, we believe, have another causation.

It has been shown above, and it is notorious, that many organs are diseased in the morbid state known as chronic Bright's disease with contracted kidneys, namely, the kidneys themselves; the minute arteries; and the capillaries; the heart; the lungs; the aorta; the brain; the retina; the spleen; the stomach; and the skin.

But these various parts and organs are not constantly affected in the same order, nor is there any constant proportion between them as to the morbid changes each may undergo. In some cases all these organs are much diseased, and more or less equally so; in other cases the morbid changes are confined to a few and isolated parts.

In some cases the changes seem to commence in the kidney or in the heart, sometimes in the lungs or in the brain, or perhaps in other organs.

Clinical medicine, especially as followed in private practice, enables us often to predict and trace these changes onwards until the morbid formation is general. Thus, a patient may come under care for headache and other allied symptoms in whom, at a given stage, the renal and cardiac functions may be normal, and as the case goes on the urine first or the heart first, or the breathing may first give signs of further lesion until, as the malady progresses, that state called chronic Bright's disease with contracted kidney may be fully produced, as shown by the thickened heart, the pale watery urine, the shrunken skin, the troubled brain, and the dimmed sight.

Observing that the pathological change may commence in various parts of the body, it might readily be surmised that the symptomatic phenomena must be very different in different cases. Experience fully shows that the symptoms are very

varied in chronic Bright's disease with contracted kidneys; and we would maintain that its prodromata and the prominent symptoms in its course vary with the organ which is primarily or predominantly diseased. But whether many or few organs are affected, the minute arteries and capillaries of the diseased parts have been found by us thickened by "hyalin-fibroid" formation. With this "hyalin-fibroid" formation in the arterioles there is an atrophy of the adjacent textures. This appears to be a characteristic of this morbid change in whatever organ it occurs.

It will follow from these facts that we cannot, as is sometimes done, regard the functional disturbances which occur in many organs during the course of chronic Bright's disease with contracted kidneys as dependent on blood changes only or chiefly. For instance, pain in the head, discomfort after food, palpitation, dry skin, epistaxis, are we believe due, not so much to changes in the blood, as to the changes we have spoken of in the tissues themselves.

The conclusions to which we have arrived may be briefly summed up as follows:

1. There is a diseased state characterised by hyalin-fibroid formation in the arterioles and capillaries.

2. This morbid change is attended with atrophy of the adjacent tissues.

3. It is probable that this morbid change commonly begins in the kidney, but there is evidence of its also beginning primarily in other organs.

4. The contraction and atrophy of the kidney are but part and parcel of the general morbid change.

5. The kidneys may be but little if at all affected, whilst the morbid change is far advanced in other organs.

6. This morbid change in the arterioles and capillaries is the primary and essential condition of the morbid state called chronic Bright's disease with contracted kidney.

7. The clinical history varies according to the organs primarily and chiefly affected.

8. In the present state of our knowledge we cannot refer

the vascular changes to an antecedent change in the blood due to defective renal excretion.

9. The kidneys may undergo extreme degenerative changes without being attended by the cardio-vascular and other lesions characteristic of the condition known as chronic Bright's disease.

10. The morbid state under discussion is allied with the conditions of old age, and its area may be said hypothetically to correspond to the "area vasculosa."

11. The changes, though allied with senile alterations, are probably due to distinct causes not yet ascertained.

Should it be considered necessary to distinguish this morbid state by any special term, we venture to suggest for that purpose the name "arterio-capillary fibrosis."

APPENDIX.

CASE 1.—William L—,¹ æt. 43, who died January 1st, 1871. The autopsy showed the kidneys were very granular and contracted. They were mottled on their surfaces, and in their cortical parts there was a quantity of yellowish-grey matter, similar to what is seen in acute nephritis. The left ventricle of the heart was dilated and its wall much hypertrophied. The heart weighed seventeen and a half ounces. There was no valvular disease. Many of the arterioles of the pia mater were much thickened, and the measurements were as follows:—

The relative width of the vessels.		Of the channel.		Of the sides or walls of the vessel.
11	...	4	...	7
15	...	5	...	10
17	...	6	...	11
10	...	2	...	8
15	...	5	...	10
28	...	8	...	13
14	...	5	...	9
16	...	6	...	10
30	...	14	...	26

¹ Further details of this patient and the cases following may be seen in the post-mortem registers of the London Hospital.

The muscular layers of the arterioles were not increased. The thickening was due to the outer layer of the vessel being increased in size. This part had a very fine fibroid appearance. In some parts it appeared to be made up of homogeneous-looking matter. Many of the arterioles were in this manner diseased.

CASE 2.—Sarah S—, æt. 63, who died January 25th, 1871. Autopsy showed that the cause of death was rupture of left ventricle of heart. The heart weighed fifteen ounces, and its left ventricle was dilated and hypertrophied. The kidneys weighed fifteen ounces; their surface was almost smooth: there was no decided granular change; the cortical parts were not contracted; the kidney substance was red, and showed venous congestion only. Very many of the arterioles were much thickened, and this was caused by a quantity of hyalin-fibroid substance outside the muscular layer, and the tunica intima in some of the vessels also was thicker than natural.

The relative width of vessel.		Of channel.		Of walls.
18	...	6	...	10
10	...	3	...	8
16	...	4	...	12
12	...	3	...	9

The muscular nuclei were very imperfect in some of the arterioles: In some parts they were normal; in others they were replaced by large clear granules, or they were entirely absent.

CASE 3.—James D—, æt. 77, died of peritonitis following strangulated hernia. The autopsy showed that the left ventricle of the heart was dilated and hypertrophied. Its valves were healthy excepting a little atheroma in the mitral. The kidneys were venously congested, otherwise they were healthy. The walls of many of the arterioles were much thickened, and this was due to a granular fibroid growth outside the muscular tissue. The outermost part of the

wall of the arterioles had a distinct fibroid appearance. Within this there was a homogeneous finely granular substance. Lying amongst this granular material were numbers of short, imperfectly developed fibres and oat-shaped nuclei. In some arterioles the muscular layer was well defined.

Relative width of vessel.		Of channel.		Of walls.
24	...	8	...	16
12	...	4	...	8
22	...	8	...	14
21	...	9	...	12
29	...	12	...	17
38	...	18	...	20

And in some of the arterioles the nuclei were faintly stained with carmine; in many other parts the muscular nuclei could not be seen, or they were very irregular in shape. The tunica intima had a coarse fibroid appearance, and in other arterioles a granular appearance. In some of the arterioles it was thicker than natural. Many of the vessels were in this manner affected.

CASE 4.—James R—, æt. 58, died of suppurative pericarditis apparently pyæmic, July 25th, 1871. The left ventricle of the heart was much hypertrophied, and the aortic and mitral valves were normal. The kidneys were small, their surfaces markedly granular, and they contained cysts.

Relative width of vessel.		Of channel.		Of walls.
20	...	8	...	12
28	...	12	...	16
22	...	8	...	14
25	...	10	...	15
40	...	20	...	20

Some of the arterioles were much thickened, others were not. The thickening was not so great as is observed in some cases. The outer and inner coats of the thickened arterioles contained a quantity of hyalin matter, and to this change

the increased size of the arteriole wall was due. The muscular nuclei were in parts shrivelled and very much wasted. The most marked disease was external to the muscular layer. The walls of the thickened capillary arterioles had a homogeneous granular appearance. A number of fat-granules were aggregated in some vessels.

CASE 5.—James S—, æt. 39, died suddenly, apparently in consequence of dilatation of the left ventricle, on 15th May, 1871. Heart weighed 1 lb. 14½ oz. The left ventricle was very much dilated and its wall hypertrophied. The left auricle was also much dilated. Valves were normal. The spleen was small. The kidneys were faintly granular and much puckered on their surfaces; on section they appeared congested, otherwise the cortical and medullary parts were natural. Some of the arterioles were much thickened, but this change was mostly seen in the very minute ones.

Relative width of vessel.		Of channel.		Of walls,
22	...	9	...	14
23	...	9	...	14
31	...	14	...	17
30	...	10	...	20
20	...	8	...	12
20	...	6	...	14
30	...	12	...	18
33	...	15	...	18

The layer outside the muscular nuclei was much thicker than natural, and it had a distinct hyalin-fibroid appearance. The muscular nuclei were very defined and normal in some parts of the arterial wall and absent in others. The capillary arterioles were also thickened, and they had a fine granular appearance.

CASE 6.—John H—, æt. about 45. He was brought into the London Hospital dead on May 20th, 1871. The left ventricle of the heart was dilated and hypertrophied. The aortic valves were calcareous and incompetent. The lungs

were emphysematous. The spleen was small. The brain was wasted. The kidneys were moderate in size, and they were very granular, and contained numbers of cysts. The cortical parts were smaller than natural. Many of the arterioles of the pia mater were much thickened. External to their muscular nuclei there was a hyalin-fibroid-looking substance, which made the external coat much thicker than normal. Many of the large capillaries were also very much thickened, and their walls had a granular or homogeneous appearance. The tunica intima of some of the arterioles was also thicker than natural.

Relative width of vessel.		Of channel.		Of walls.
28	...	9	...	19
27	...	7	...	13
25	...	8	...	17
21	...	8	...	13
21	...	9	...	12
33	...	10	...	23
20	...	7	...	13
13	...	5	...	8
23	...	9	...	14
11	...	3	...	8
25	...	9	...	16
25	...	9	...	16
14	...	4	...	10
10	...	2	...	8
30	...	9	...	21

CASE 7.—Edward L—, æt. 42; died of erysipelas secondary to a scalp wound. Autopsy Dec. 28th, 1870. The lungs were very emphysematous, more or less, throughout, and there was capillary bronchitis. Many of the minute bronchial tubes were filled with pus. The left ventricle of the heart was dilated and somewhat hypertrophied, also the right ventricle. The spleen and liver were natural; the kidneys were faintly granular, otherwise healthy.

Many of the arterioles and capillaries of the pia mater were much thickened. In the coats of the arterioles external to the muscular nuclei a quantity of hyalin-fibroid substance was seen, and to this change the thickening was due.

The nuclei of the muscular tissues were very indistinct in some parts and absent in others. The walls of the capillaries were thickened by the formation of a granular or homogeneous substance.

The relative width of vessel.	Of its channel.	Of its walls.
7 ...	2 ...	5
10 ...	3 ...	7
9 ...	3 ...	6
11 ...	3 ...	8
13 ...	3 ...	10
12 ...	5 ...	7
34 ...	12 ...	22
32 ...	12 ...	20
44 ...	18 ...	26
42 ...	16 ...	26

CASE 8.—Emma C—, æt. 9 years. The kidneys were very much smaller than natural, especially the left; one weighed 2 oz., the other $1\frac{1}{4}$ oz. The kidneys in consequence of being greatly contracted were much out of shape; their cortical parts were much reduced in size; their surfaces were very irregular and puckered, not finely granular. The heart's left ventricle was dilated and hypertrophied; its valves were healthy. The spleen was small and tough. Some of the arterioles of the pia mater were very much thicker than natural, owing to the layer outside the muscular layer being much increased.

The relative width of vessel.	Of channel.	Of walls.
30 ...	12 ...	18
32 ...	12 ...	20
36 ...	14 ...	22
34 ...	14 ...	20
36 ...	10 ...	26
20 ...	6 ...	14
20 ...	6 ...	14
18 ...	6 ...	12
20 ...	8 ...	12
20 ...	8 ...	12
18 ...	6 ...	12
20 ...	8 ...	12

The relative width of vessel.	Of channel.	Of walls.
18 ...	8 ...	10
18 ...	5 ...	13
14 ...	6 ...	8
20 ...	8 ...	12

The layer external to the muscular nuclei was thicker than the tunica intima and tunica media, taken together, and in the larger arterioles it had a fine fibroid or hyalin-fibroid appearance. The thickening was most marked in the capillary arterioles or larger capillaries, and this change was due to the formation of granular hyalin substance in the walls of these vessels. The arterioles of the kidneys were much thickened by fibroid changes.

CASE 9.—Margaret B—, æt. 68, died of acute meningitis following iridectomy. The kidneys were granular and cystic, but not apparently contracted. The left ventricle of the heart was slightly dilated and slightly hypertrophied. Some of the arterioles of the pia mater were much thickened, and their outer coats were much increased in size. This portion of the vessel was thickened by the formation of a hyalin-fibroid substance.

The relative width of the vessels.	Of the channel.	Of the walls.
35 ...	14 ...	21
52 ...	19 ...	33
25 ...	7 ...	18
38 ...	10 ...	28
21 ...	5 ...	16
27 ...	6 ...	21
15 ...	6 ...	9
22 ...	5 ...	17
25 ...	8 ...	17

Many of the arterioles appeared to be healthy. The outer coats of the larger arterioles were thickened by a fine fibroid substance. The thickened capillary arterioles had a homogeneous appearance.

CASE 10.—Thomas B—, æt. 69, died of senile gangrene, May 4th, 1871.—The kidneys were granular and cystic, but not contracted. The heart weighed 16½ oz., the left ventricle was dilated and its wall hypertrophied; there was no valvular disease. The lungs were emphysematous and the brain atrophied.

The relative width of the vessels. Of the channel.			Of the wall.	
29	...	12	...	17
30	...	14	...	16
21	...	9	...	12
28	...	16	...	12
22	...	8	...	14
32	...	13	...	19
38	...	16	...	22
30	...	10	...	12
20	...	6	...	14
42	...	20	...	20
26	...	8	...	18
24	...	8	...	16

The outer coats of the arterioles were much increased in size, and the vessels in consequence were thickened.

Almost all the arterioles of the pia mater were thickened more or less, but the amount of thickening varied very much in the different vessels; in some it was little, so that it did not much increase the diameter of the vessels; in others it was very great, and it was due to hyalin-fibroid changes in the walls of the arterioles external to their muscular coats.

The tunica intima of some of the arterioles was also increased in size. The walls of the minute capillary arterioles were very much thickened, and they had a molecular hyalin appearance. The muscular nuclei of the arterioles were stained in parts and they appeared to be normal; in other parts they were wasted and indistinct. A number of fat-globules were aggregated together in the walls of many of the minute vessels.

CASE 11.—Frederick B—, æt. 31. The kidneys weighed

10½ oz., they were markedly granular, and the cortex was somewhat wasted and they contained several cysts. The left ventricle of heart was hypertrophied and dilated; its valves were healthy; its right side was also dilated; the spleen was large and dark.

Relative thickness of vessel.		Of channel.		Of walls.
23	...	7	...	16
30	...	8	...	22
18	...	6	...	12
25	...	8	...	17
29	...	7	...	22
21	...	6	...	15
26	...	9	...	17
28	...	9	...	19
16	...	6	...	11

The cerebral arteries were atheromatous, and the brain was wasted; many of the arterioles of the pia mater were much thickened by hyalin-fibroid substance outside the muscular nuclei.

CASE 12.—Sarah R—, æt. 32, died August 24th, 1871. The kidneys were granular and contracted. The post-mortem appearances have not been described in the register.

The relative width of vessels.		Of channel.		Of walls.
21	...	8	...	13
22	...	8	...	14
23	...	9	...	14
24	...	6	...	14
20	...	8	...	13
20	...	7	...	13
31	...	9	...	22
27	...	8	...	19
23	...	7	...	16
21	...	8	...	13

The arterioles were very much thickened and their coats outside the muscular layer were much increased in size; some of the arterioles were apparently unaffected, but in many were thickened. The layer outside the muscular

nuclei of the thickened arterioles was seen to consist of a hyalin-fibroid substance, and the thickening was caused by this new material. In this new formation a number of minute nuclei were seen.

CASE 13.—James P—, æt. 49. The kidneys were not granular; but large and mottled, and their appearance indicated that they had been recently the seat of acute nephritis. The left ventricle of the heart was dilated. The liver was in the condition known as incipient cirrhosis.

Many of the minute arteries of the pia mater were much thickened, and the layer outside the muscular tissue was increased; it was much thicker than the middle and inner coat taken altogether, and this thickening was due to a hyalin-fibroid substance. In some of the arterioles the muscular nuclei were very indistinct and they were replaced by fat-granules; in others they were very distinct. The arterioles were not all equally involved. Some of the arterioles of the left ventricle of the heart were much thickened by fibroid formation, also the arterioles of the kidneys and skin. In the capillary walls fat-granules were aggregated in greater numbers. The relative size of the different parts of the vessels are given below.

Relative width of vessel.		Of channel.		Of walls.
15	...	5	...	10
13	...	5	...	8
15	...	6	..	9
12	...	5	...	7
30	...	10	...	20
19	...	7	...	12
25	...	10	...	15
28	...	12	...	20
15	...	5	...	10
9	...	3	...	6

The outline of nearly all the minute arteries were unusually clearly defined. The channels of the thickened arteries were not appreciably encroached upon.

CASE 14.—George T—, æt. 67, died of cerebral hæmorrhage. We regret that we could not obtain detailed particulars of this case.

Many of the arterioles were very much thickened outside the muscular layer by a hyalin-fibroid substance. Amongst this new material were a number of indistinct corpuscles or nuclei which at first sight looked like muscular tissue, but the muscular layer was observed to be entirely distinct from those imperfectly formed elementary bodies.

The relative width of vessel.		Of channel.		Of walls.
24	...	9	...	13
22	...	7	...	15
57	...	21	...	36
38	...	9	...	30
57	...	21	...	38

CASE 15.—Charlotte A—, æt. 55. The kidneys were coarse on the surface, they were also wasted. They weighed $7\frac{1}{4}$ oz. Heart weighed 1 lb. $1\frac{1}{4}$ oz.; its left ventricle was dilated and hypertrophied. Many of the arterioles of the pia mater were very much thickened, and the coat outside the muscular layer was much increased by hyalin-fibroid formation. The new tissues in some of the thickened vessels were coarsely fibroid. The muscular nuclei were much altered in some of the arterioles.

The relative width of the vessel.		Of the channel.		Of the walls.
36	...	16	...	20
32	...	12	...	20
28	...	11	...	17
36	...	16	...	20

CASE 16.—James B—, æt. 48. Cause of death was dilatation of the left ventricle. The kidneys weighed $12\frac{1}{4}$ oz., they were very granular, and contained a few cysts. The cortical parts were very little contracted. Liver capsule was thickened. Heart weighed 1 lb. 8 oz., and the left ventricle was much dilated and hypertrophied. Very many of the arterioles

of the pia mater were very much thickened, and their outer coats were much increased by the formation of hyalin-fibroid substance. The tunica intima in some arterioles was also much increased in size by the formation of hyalin-fibroid substance, and the larger capillaries were thickened by homogeneous or granular material.

In some of the arterioles the new tissue was very distinctly fibroid, and the hyaline appearance was not well marked. The muscular nuclei were wasted in some parts of these vessels, and the muscular layer seemed thicker than natural in other parts.

The relative width of the vessel.	Of the channel.	Of the walls.
32	...	11
33	...	8
33	...	8
		22
		22
		25

CASE 17.—A man, æt. 64, had a cyst in the brain, died in the Whitechapel Workhouse. The kidneys were markedly granular, but not much contracted. The left ventricle was hypertrophied and dilated. For these particulars we are indebted to Dr. Ilott, the resident Medical Officer of the Whitechapel Workhouse.

The arterioles in the pia mater were very much thickened, and the coat outside the muscular layer of these vessels was greatly increased by fibroid changes. This condition was very well marked in many of the arterioles, and the muscular nuclei were very distinct and clearly defined in some, and a good deal wasted in others.

The relative width of vessels.	Of channel.	Of walls.
18	...	6
36	...	13
36	...	14
42	...	15
31	...	9
36	...	14
35	...	11
30	...	8
26	...	8
		12
		23
		22
		27
		22
		22
		24
		22
		18

CASE 18.—James B—, æt. 50, died of acute nephritis; the kidneys were large and their surfaces smooth; were very much congested and mottled; some gray material was scattered amongst the highly congested tissue. The cortical portions had a similar appearance, and they were increased in size. The kidneys had the morbid appearances commonly seen in an early stage of acute nephritis. *Heart.*—The left ventricle was much dilated and hypertrophied, and its valves were healthy. Many of the arterioles of the pia mater, especially the smaller ones, were very much thickened, and their outer coats increased in size. Some of the vessels were not uniformly thickened, but in parts only. The muscular nuclei were in some of the arterioles very indistinct and in other parts absent; they were replaced by a granular substance; outside the muscular layer there was a quantity of hyalin-granular or hyalin-fibroid substance which caused the thickening. The walls of the larger capillaries were infiltrated with a similar hyalin-granular substance; many capillaries were in this manner diseased.

Relative width of vessel.		Of channel.		Of walls.
19	...	6	...	13
20	...	7	...	13
32	...	11	...	22
21	...	8	...	13
27	...	9	...	18
40	...	13	...	27

CASE 19.—Samuel C—, æt. 62, died suddenly in a comatose condition. The brain was considerably wasted. The cerebral arteries were very atheromatous. Spleen weighed 4 oz., liver 2 lb. 11 oz. The kidneys weighed 8 oz., and with the exception of the capsule being adherent they were normal. These organs were very carefully examined by Dr. Hughlings Jackson and Dr. Sutton, and they both agreed that they presented no other signs of disease. The heart weighed 15 oz., it was much increased in size, owing to dilatation and hypertrophy of the left ventricle. Its valves were



healthy. Lungs were emphysematous. Many of the arterioles of the pia mater were very much thickened, the layer outside their muscular tissue was much increased in size. This was due to a fine granular transparent substance. This new material was seen between the muscular nuclei and the coarser fibres of the tunica adventitia. The larger capillaries were also much thickened, and their walls had a granular or homogeneous appearance.

Relative width of vessel.		Of channel.		Of walls.
40	...	16	...	24
42	...	14	...	28
42	...	14	...	28
60	...	28	...	32
54	...	24	...	30
54	...	22	...	32
50	...	20	...	30
28	...	10	...	18
30	...	10	...	20
30	...	12	...	18
34	...	14	...	20
40	...	16	...	24
40	...	16	...	24
26	...	8	...	18
28	...	12	...	16
30	...	10	...	20
32	...	12	...	20
22	...	8	...	14
22	...	8	...	14
24	...	8	...	16

CASE 20.—William H—, æt. 51. There was softening of the cerebellum. The kidneys weighed $11\frac{1}{4}$ oz. They were granular, and they contained the remains of the two embolic blocks, otherwise they were healthy. The heart weighed 1 lb. 9 oz. All its cavities were dilated and the ventricular walls much hypertrophied; some vegetations on the aortic valves.

Many arterioles were very much thickened, and the layer outside the muscular nuclei was much increased in size. In this part a quantity of hyalin-granular and finely marked fibroid substance was seen. The walls of some of the arterioles were unequally thickened. The tunica intima was also

thicker than natural, owing to the formation of a fine fibroid tissue. The muscle of the arterioles was much wasted in some spots, and replaced by bodies which looked like large fat-granules. The larger capillaries were very much thickened, and their walls had a fine granular appearance.

The relative width of vessel.		Of channel.		Of walls.
24	...	8	...	16
28	...	10	...	18
36	...	16	...	20
32	...	12	...	20
72	...	18	...	54
72	...	16	...	56
20	...	8	...	12
20	...	8	...	12
24	...	8	...	14
38	...	16	...	22
40	...	16	...	24
44	...	18	...	26
44	...	16	...	28
32	...	12	...	20
30	...	12	...	20
30	...	10	...	20

CASE 21.—William S—, æt. 56, died on Nov. 24th, 1871.

Autopsy showed that the heart was enlarged; it weighed 19 oz. The right ventricle was much dilated and the left ventricle was also dilated and hypertrophied. The lungs were emphysematous. Liver was in an early condition of cirrhosis. Kidneys weighed 11 oz., their surfaces were granular. One kidney was much contracted, the other rather larger than natural. There were indications also of recent acute nephritis.

Microscopical examination of the pia mater showed that many of the arterioles were healthy, excepting that their outline was much more sharply defined than natural. Some of the arterioles were much thickened, and this was due to the increased size of their outer coat. The new formation in this part had a very fine hyalin-fibroid appearance. Some

of the larger capillaries were very much thickened and their walls were granular and translucent. A quantity of fat-globules were aggregated together in the coats of the minute vessels.

Diameter of the vessel.		Of the channel.		Of the walls.
16	...	5	...	11
22	...	7	...	16
40	...	15	...	25
23	...	10	...	18
32	...	17	...	15
36	...	20	...	16
26	...	13	...	13

CASE 22, a patient under the care of Dr. Hughlings Jackson, died in the Epileptic Hospital in Nov. 1871.

We are indebted to Dr. Jackson for kindly affording us the opportunity of examining the pia mater and kidneys. The left ventricle of the heart was much hypertrophied. The kidneys were very granular and their cortical parts were very much contracted.

Many of the arterioles of the pia mater and kidneys were very much thickened. The layer outside the muscular nuclei was much thicker than natural, and this was due to the formation of hyalin-fibroid substance. The muscular tissue was not appreciably increased, but it was wasted in parts, and in some spots the muscular nuclei were entirely absent. The outer layer of the larger vessels was also thickened by a similar fibroid change.

Diameter of the vessel.		Of the channel.		Of the walls.
32	...	12	...	20
28	...	11	...	17
22	...	8	...	14
26	...	9	...	17
35	...	14	...	19
48	...	25	...	23
52	...	25	...	27
33	...	10	...	23
27	...	10	...	17
24	...	9	...	15
22	...	8	...	14

CASE 23.—Edward S—, æt. 46. Autopsy, February 22nd, 1872 (p. 133 post-mortem register for 1872). The brain was healthy; lungs were œdematous. Heart weighed 1 lb. 15½ oz.; its left ventricle was very much dilated, and its wall much hypertrophied; valves and orifices healthy. Right ventricle and auricle were also dilated. Liver and spleen presented no noticeable change. Kidneys—their surfaces were granular and mottled. A quantity of grayish material was seen amidst highly congested tissue. The appearances were such as are usually considered to indicate acute nephritis. The cortical parts were very much contracted, so that the tubes in part almost reached the surface of the kidney. The cortex also mottled like the surface. The arterioles of the pia mater were healthy. They were very carefully examined, and they presented none of the hyalin-fibroid changes seen in other cases, nor were there any indications of thickening. The arterioles of the skin, stomach, and kidneys, were greatly thickened by the formation of hyalin-fibroid material.

CASE 24.—John J—, æt. 37 (see post-mortem register for 1872, p. 237). Autopsy, April 22nd, 1872. The lungs were congested and œdematous. There was evidence of recent pericarditis. The heart weighed 1 lb. 2¼ oz.; its left ventricle was much hypertrophied; its valves and orifices were healthy. The right ventricle was also greatly dilated. The capsule of the liver was slightly thickened; this organ was otherwise healthy. Spleen—its capsule was also slightly thickened, but its substance apparently healthy. Stomach was healthy. Kidneys were very granular, mottled on their surface, and grayish material scattered here and there; the latter apparently the product of acute nephritis. The cortical parts were much contracted. The arterioles of the skin were very much thickened by fibroid material. This new formation was seen outside the muscular layer. The fibroid formation had a coarse fibre-like appearance. The arterioles of the retina

were also thickened by the formation of a hyalin-fibroid material.

CASE 25.—Elizabeth L—, æt. 42. Autopsy, April 2nd, 1872 (see post-mortem register for 1872, p. 201). A very large blood-clot was found in the left hemisphere, outside the optic thalamus. There was a small clot in the pons varolii, and a cyst in the right hemisphere. The left ventricle of the heart was considerably hypertrophied. Heart's valves and orifices healthy. The lungs, liver, and spleen were natural. The kidneys were very granular, small, and their cortex was much contracted. Many of the minute arterioles were thickened, some of them very much so by hyalin-fibroid substance outside the muscular layers. In a great many of the arterioles and capillaries a quantity of fat-granules were aggregated together.

Besides the above cases in which the arterioles were very much thickened we examined ten other cases in which some of the arterioles of the pia mater were thickened, though to a much less extent. In these cases the morbid condition appeared to be in a much earlier stage, but the histological changes were similar in kind though less in extent to those observed in the very thick vessels.

CASE 26.—Elizabeth R—, æt. 44. The kidneys weighed 8 oz.; they were slightly granular and contained cysts. The lungs were extremely emphysematous. The brain was atrophied. The heart weighed $10\frac{1}{2}$ oz.; its left ventricle appeared to be slightly dilated, and there was atheromatous disease of the aortic valves. The outer layers of a few of the arterioles were thicker than natural owing to the formation of a hyalin-fibroid tissue, and this new formation was seen outside the muscular nuclei.

The width of the arterioles.	Of its channel.	Of the sides or walls.
30 ...	18 ...	12
30 ...	19 ...	11
45 ...	28 ...	15
22 ...	10 ...	12
A 25 ...	10 ...	15
B 22 ...	9 ...	14
24 ...	16 ...	8
14 ...	8 ...	6

CASE 27.—John S—, æt. 74, died of broncho-pleuro-pneumonia. The lungs were emphysematous. The liver atrophied. The spleen was also atrophied; it weighed only 4½ oz. The kidneys were slightly granular, and not contracted; they weighed 15 oz. The increased weight was apparently due to venous congestion. The heart weighed 15 oz. There was no valvular disease, and the left ventricle was dilated and somewhat hypertrophied. A few of the arterioles were markedly thickened.

The width of the arterioles.	Of the channel.	Of the sides or walls.
A 10 ...	3 ...	7
B 13 ...	5 ...	8
C 57 ...	24 ...	33
D 32 ...	10 ...	22
12 ...	6 ...	6
14 ...	6 ...	8
10 ...	4 ...	6

The increased size of the arterial walls was due to the formation of a hyalin-fibroid tissue in the outer coat of the vessels. There was no evidence of muscular hypertrophy.

CASE 28.—A man, æt. 60, died in the London Hospital August 28th 1871, of epithelioma of the œsophagus. The heart was moderately dilated. Some of the arterioles of the pia mater were thickened by the formation of fine fibroid-looking tissue in their outer coats. There was no muscular hypertrophy; the walls of some of these thickened vessels were very irregular in size. The measurements are given, and the letters A B C D E F indicate the thickened ones.

By far the greater number of the arterioles were not thickened. A large number of fat-granules were aggregated in the walls of the minute vessels.

The width of the arterioles.		Of its channel.		Of the sides or walls.
A 31	...	11	...	20
B 32	...	11	...	23
C 26	...	7	...	19
D 25	...	15	...	20
E 20	...	8	...	12
F 28	...	10	...	18
35	...	18	...	17
19	...	18	...	11
19	...	18	...	11
40	...	21	...	19
22	...	12	...	10
30	...	14	...	16

CASE 29.—James C—, æt. 74, died in the London Hospital with disease of the knee-joint November 25th, 1871. The autopsy showed that the heart's muscle had undergone fatty degeneration. The condition of its cavities is not mentioned in the post-mortem record. The lungs were emphysematous; the arteries were very atheromatous; the renal capsules were adherent and the kidneys contained cysts; the outer coats of some of the arterioles were thickened by the formation of some coarse-looking fibroid tissue. The measurements of the thickened ones were as follows:

Width of the arteriole.		Of the channel.		Of the sides or walls.
19	...	7	...	12
13	...	5	...	8
17	...	7	...	10

CASE 30.—George G—, æt. 57, died of acute peritonitis following hernia. Autopsy July 12th, 1871. The spleen was atrophied, it weighed $3\frac{1}{4}$ oz. only. Liver atrophied and weighed 2 lb. 11 oz.; the kidneys weighed 11 oz.; they were slightly granular, otherwise natural; the heart weighed 12 oz. A few of the arterioles were slightly thickened in their outer coats by the formation of a fine hyalin-fibroid

tissue; by far the majority of the arterioles were not thickened. The measurements and letters A B show the proportions of the slightly thickened arterioles, the remaining measurements show no evidence of thickening.

Width of the arteriole.		Of its channel.		Of its sides or walls.
A	39 ...	16	...	23
B	46 ...	21	...	25
	31 ...	15	...	16
	47 ...	27	...	20
	38 ...	22	...	16
	51 ...	28	...	23
	38 ...	27	...	11
	18 ...	9	...	9
	10 ...	5	...	5
	14 ...	7	...	7
	11 ...	6	...	5

CASE 31.—A man, aged about 45, died of acute pneumonia. The kidneys were healthy, and the heart weighed 14 oz. Its left ventricle was slightly dilated. None of the arterioles were greatly thickened, but the walls of some of them were more sharply defined than natural, and the outer layers of a few arterioles were somewhat thickened and had a fine fibroid appearance. The muscular nuclei were indistinct in many of the vessels. The measurements given show the amount of thickening:

Width of the vessel.		Of its channel.		Of its sides or walls.
42	...	19	...	23
42	...	20	...	22

CASE 32.—A female, died after removal of cancer in the breast January 20th, 1872. The kidneys were granular, but not markedly wasted. Pericardium was adherent. The left ventricle of the heart appeared somewhat dilated; its valves and orifices were healthy; its muscle was very fatty. The arterioles of the pia mater were very sharply defined, and their outer layers seemed thickened by the formation of a fine fibroid tissue.

CASE 33.—Robert B—, died December 2nd, 1871, The autopsy showed vesicular emphysema. The heart was normal. The kidneys were large and mottled, they presented the appearances seen in. a somewhat early stage of acute Bright's disease. The vessels were, for the most part, healthy; the only noticeable change was that the outlines of the arterioles were more sharply and clearly defined than natural. Only one arteriole was found with its outer layer thicker than natural, and it had a fine hyalin-fibroid appearance, and only one capillary arteriole was observed much thickened; its wall had a granular homogeneous appearance. The measurement indicated by the letter A show the proportions of the thickened vessel; the remaining measurements do not indicate any thickening.

Width of the vessel.		Of its channel.		Of the sides or walls.
A 22	...	8	...	16
32	...	10	...	12
34	...	20	...	14
42	...	25	...	17
44	...	26	...	18

CASE 34. — William W—, æt. 63, died of cerebral hæmorrhage November 11th, 1871. The heart weighed 18 oz.; its left ventricle was somewhat dilated. There was no valvular disease. The kidneys weighed 10½ oz., and they were healthy. The spleen was wasted. The outer layers of some of the arterioles were slightly thickened by the formation of a fine fibroid tissue. This was most distinctly seen outside the muscular nuclei. In no place were the arterioles greatly thickened. The measurements given show the thickening was not great.

Width of the arteriole.		Of the channel.		Of the sides or walls.
24	...	10	...	14
16	...	8	...	8
28	...	12	...	16
36	...	14	...	22

CASE 35.—Chas. M—, æt. 49. Autopsy December 9th, 1871; cause of death contusion of brain, the resul of injury.

Heart weighed 14 oz. Vegetations were seen on the aortic valves. Liver was congested, and weighed 3 lbs. 2½ oz. Kidneys weighed 9 oz., their surfaces were slightly granular and cystic; cortical substance small. Some of the arterioles were thickened in their outer layers by the formation of a fibroid substance. The measurements given show the degree of thickening.

Width of the vessel.		Of its channel.		Of its sides or walls.
46	...	16	...	30
37	...	18	...	19
72	...	26	...	50

CASES in which the minute arteries and capillaries were healthy, but there were fat-granules, so called in the walls of some of the vessels.

No.	Reference in post-mortem register.	Initials.	Sex.	Age.	Post-mortem appearances of viscera.	Condition of arterioles.	Measurements of the arterioles, made from a scale divided into sixteenths of an inch.		
							Diameter of arterioles.	Of channel.	Of wall.
36	July 26th, 1871	Sarah N—	F.	...	So-called catarrhal pneumonic phthisis, or broncho-pneumonic phthisis; lungs very much diseased; other viscera healthy, excepting intestines	The muscular nuclei were very distinct and stained very well; in the minute arterioles they almost touched the outer edge of the tunica adventitia; not the least evidence of thickening	14 18 29 17 33 31 36 17 13 21	14 10 13 8 21 19 22 8 7 13	6 8 16 9 12 12 14 9 6 8
37	Sept. 19th, 1871	Sarah S—	F.	51	Acute tuberculous capillary bronchitis; kidneys healthy, excepting tubercle in them; heart healthy	The muscular nuclei were distinct, but not well stained; in the minute arterioles they almost touched the outer edge of the tunica adventitia; and the vessels were not thickened	34 30 34 25 36 44 26 23 19	16 15 15 15 18 27 14 12 10	18 15 19 15 18 17 12 11 9
38	Nov. 27th, 1871	John B—	M.	22	Acute tuberculous; tubercular meningitis; lung studded with tubercle cavity at one apex; liver and kidneys contained tubercle	The arterioles appeared to be healthy; and the muscular nuclei appeared to extend, or almost, to the outer edge of the tunica adventitia; vessels were not thickened	24 22 26 20 20 18 16 ...	12 12 10 12 10 10 8 8 ...	12 12 6 8 10 8 8 ...

No.	Reference in post-mortem register.	Initials.	Sex.	Age.	Post-mortem appearances of viscera.	Condition of arterioles.	Measurements of the arterioles, made from a scale divided into $\frac{1}{100}$ of an inch.		
							Diameter of arterioles.	Of channel.	Of wall.
39	Nov. 28th, 1871; page 474 of p.-m. record for 1871	Julia P—	F.	32	A large blood-cyst in the spleen, which had burst, and some of its contents had escaped into the peritoneal cavity and set up acute peritonitis; the kidneys were faintly granular, and slightly contracted; heart weighed eight ounces; muscular tissue, valves, and its cavities, were healthy; liver adherent to cyst, otherwise healthy; brain healthy	There was no evidence of thickening, and no appearance indicating a sheath apart from the tunica adventitia; the muscular nuclei in the arterioles almost touched the outer edge of the tunica adventitia, and they were very distinctly seen; a few aggregations of fat-granules were seen in the walls of the vessels	24 22 20 18 20 22 20	14 12 12 10 12 10 10	10 10 8 8 8 12 10
40	Nov. 22nd, 1871, page 470 p.-m. record	James F—	M.	22	Fractured cervical vertebrae; spinal cord crushed; lungs much congested; pericardium healthy; heart, liver, spleen, brain, kidneys natural	The arterioles appeared to be healthy; the muscular nuclei almost touched the outer edge of the tunica adventitia; the latter layers in some of the vessels had a very distinct fibrous appearance; there was no evidence to show that the vessels were thickened	28 28 26 22 26 32 28 30 30	14 16 12 14 14 16 14 16 16	14 12 14 9 12 16 14 14 14
41	Nov. 20th, 1871, page 454 p.-m. record	Fredrick S—	M.	26	Pericardium not adherent; heart weighed 1 lb. 3 oz.; left ventricle much dilated; aortic valves, when tested by pouring water in the aorta were found to be incompetent; lungs were studded with apoplectic masses; liver slightly cirrhotic; spleen firm and congested; also intestines and kidneys were congested	The arterioles appeared to be healthy; the muscular nuclei almost touched the outer edge of the wall of the vessel; in other parts there was a thin layer of tunica adventitia intervening; the muscular layer was everywhere very distinct; the tunica adventitia was not increased; there were a few fat-granules aggregated in the walls of the vessels	32 32 30 32 32 30 36 30	20 18 18 18 18 14 24 23	12 14 12 14 16 12 13 14

No.	Reference in post-mortem register.	Initials.	Sex.	Age.	Post-mortem appearances of viscera.	Condition of arterioles.	Measurements of the arterioles, made from a scale divided into sixteenths of an inch.			
							Diameter of arterioles.	Of channel.	Of wall.	
47	Nov. 18th, 1872	Thomas M—	M.	39	Syphilitic changes in liver; spleen, acute pleurisy; heart, left ventricle natural, vegetations on aortic valves, the remaining valves and the orifices were natural; kidneys and brain were natural	The vessels were apparently healthy, with the exception of fat-granules being aggregated here and there; no indications of thickening; no hyaline-fibroid change	39 38 28 24 24 26 14 16	20 26 14 18 12 16 8 10	19 17 14 10 12 10 6 8	
48	Nov. 18th, 1871	David E—	M.	32	Death due to the administration of chloroform; viscera healthy; muscle of heart soft, and its left ventricle slightly dilated; heart weighed 1½ oz.	Arterioles presented no abnormal appearances; no indications of hyaline-fibroid changes	22 38 26 19	12 17 14 11	10 15 12 8	
49	March 7th, 1872	...	...	17	Autopsy: viscera healthy; death following injury to right hand and arm	Arterioles of pia mater were healthy; no indications of hyaline-fibroid changes	...	...	...	...
50	March 5th, 1872	William E—	M.	35	Death due to poisoning by corrosive sublimate; there was oedema of larynx and false membrane on the mucous surface of trachea; mucous surface of large intestine congested; rest of viscera healthy	Arterioles of pia mater were healthy; their muscular nuclei were well stained, and lying near the outer edge of the arteriole wall; no hyaline-fibroid changes	...	...	...	...
51	Jan. 27th, 1872	Ann C—	F.	25	Autopsy: death due to bronchitis; heart; right ventricle much hypertrophied and dilated; pericardium healthy	Arterioles of the pia mater were healthy; they presented no hyaline-fibroid appearances; muscular nuclei	...	...	...	...

52	Nov. 21st, 1871, page 466p.-m.re- cord	F.	51	Heart was small, and muscle pale and studded with yellow markings indicative of fatty degeneration, valves and orifices natural; liver capsule thickened; spleen normal; kidneys pale, otherwise they were normal; intestines and other vis- cera healthy	Heart was small, and muscle pale and studded with yellow markings indicative of fatty degeneration, valves and orifices natural; liver capsule thickened; spleen normal; kidneys pale, otherwise they were normal; intestines and other vis- cera healthy	The arterioles were apparently healthy; their outline was not sharply defined, and there was no evidence of hyalin-fibroid thickening or of the muscular nuclei almost touched the outer edge of the walls of the vessel	24 22 36 88 36 22 36	12 12 22 22 22 22 20	13 10 14 16 16 14 16	...	...	...	...
53	Feb. 21st, 1872	M.	56	Autopsy showed acute endocar- ditis; left ventricle and muscle of heart dilated; disease of the aortic valves; acute pneumonia and plen- tary; morbid changes in the kid- neys, indicating acute nephritis	Autopsy showed acute endocar- ditis; left ventricle and muscle of heart dilated; disease of the aortic valves; acute pneumonia and plen- tary; morbid changes in the kid- neys, indicating acute nephritis	There were no indications of thickening in the vessels of the pia mater; the nuclei of the muscular fibres almost touched the outer edge of the arterioles, and there was in consequence very little appearance of tunica adventitia; there were no aggregations of fat-granules	38 44 27 81	23 25 16 16	16 19 12 15	...	...	...	...
54	Jan. 24th, 1872	F	43	Autopsy showed broncho-pneumo- nic phthisis	Autopsy showed broncho-pneumo- nic phthisis	The arterioles were healthy; there was no evidence of thickening; the muscular nuclei were seen close to the outer edges of the walls of these vessels; there were no large aggrega- tions of fat-granules	29 44 16	17 28 9	13 16 7	...	...	...	...
55	Dec. 4th, 1871	M.	62	Stricture of the urethra; fibroid degeneration in the lungs; dilated right ventricle of heart; liver cir- rhotised; hypertrophied brain	Stricture of the urethra; fibroid degeneration in the lungs; dilated right ventricle of heart; liver cir- rhotised; hypertrophied brain	The arterioles were healthy; the muscular nuclei were very well stained, and they were seen lying close to the outer edge of these vessels; there were no aggregations of fat-granules	50 42 40 40	28 23 22 23	23 19 18 18	...	...	...	...

The arterioles, in some cases, were free from thickening, and the heart was not hypertrophied; whilst there was chronic disease of the kidney, viz., large white kidney and so-called scrofulous pyelitis.

CASE 56.—This occurred in a patient named William E—, æt. 33. He was in the London Hospital many weeks with great and general œdema, and the urine contained a large quantity of albumen. While in the hospital he had attacks of great dyspnoea also of vomiting; and a week or two before he died he had convulsions alternating with coma.

The autopsy showed that the kidneys were larger and much heavier than natural. Their capsules separated readily; their surfaces were smooth and white, and very few vessels were seen. The kidneys had the peculiar, general, marble-white appearances so well represented by Dr. Bright in one of his drawings of Bright's disease. The cortical parts were much increased in size and appear to be infiltrated with similar white material. Heart was normal. The arterioles of the pia mater were not thickened.

CASE 57.—In the case of a man, who died in the London Hospital under the care of Dr. Andrew Clark, there was general œdema; the urine contained a large quantity of albumen, and there were symptoms of uræmic poisoning. The kidneys were in the morbid condition known as "large, white, and mottled." Heart was normal. The arterioles of the pia mater were carefully examined, and there were no indications of thickening.

CASE 58.—In a third case a girl, aged 7 years, who died in the London Hospital, under the care of Dr. Down, February, 1872, there were large white kidneys and general œdema. Heart was natural. The arterioles were not thickened. The disease in this case was of considerable standing, for the patient had been under Dr. Down's observation with albuminuria for more than twelve months, and she was in the London Hospital with kidney disease on more than one occasion.

CASE 59.—A fourth case was that of George G—, æt. 18. He was in the London Hospital several weeks with general œdema and a large quantity of albumen in the urine. He died with symptoms of uræmic poisoning. The autopsy on May 6th, 1872, showed the kidneys weighed $14\frac{1}{2}$ oz. They were much larger than natural and their capsules separated readily; their surfaces were smooth and contained no cysts. They were of a pale fawn colour, and a large number of yellow spots were seen scattered in the cortical parts. The cortex was greatly increased in size and converted into similar fawn-coloured substance. These organs were good examples of large white kidneys in an advanced stage of the disease. Heart weighed 8 oz., there was no dilatation or hypertrophy; its valves and orifices were healthy. Liver, spleen, and lungs were healthy. The walls of the arterioles were not thickened. In the minuter ones the muscular nuclei were situated close to the outer edges of the vessel.

CASE 60.—A fifth case was that of William L—, æt. 27, who died in the London Hospital. It was stated that he had been under the care of Dr. Thorowgood, at the Victoria Park Hospital, for many months with symptoms of phthisis and strumous pyelitis. The capsules of the kidneys were very much thickened, and the right kidney was adherent by old tough fibrous bands to the liver and intestines. On section, this kidney seemed almost completely destroyed. It contained several cavities filled with thick puriform matter. There was very little kidney structure remaining. The left was similarly affected, but not to the same great extent. Heart healthy.

The arteries of the pia mater were injected with Beale's Prussian blue solution and afterwards carefully examined by aid of the microscope, and there were no indications of arterial thickening.

In other cases (see case No. 13, James P—, æt. 49) the kidneys were large, white, and mottled, the arterioles were thickened by hyalin-fibroid changes, and the left ventricle of the heart was dilated.

In the latter case we cannot conclude that the kidney disease induced the morbid changes in the arterioles and heart; for there is no evidence to show that the cardio-vascular changes did not precede the renal disease; and the case of James B—, æt. 50 (see Case 18), tends to show that the cardio-vascular changes may be the primary and antecedent disease, and the renal changes subsequent. In this case the kidneys were highly congested and mottled, and a quantity of grayish-looking material was lying amongst this highly congested tissue. These kidneys were large and their cortex was much increased in size, and their surfaces were smooth. The morbid appearances were such as are usually seen when death has occurred in an early stage of acute nephritis, and they appear to show that the kidney disease had probably set in a few weeks only before death. The left ventricle of the heart was much dilated and hypertrophied, and many of the arterioles and capillaries were greatly thickened by the hyalin-fibroid changes. The cardio-vascular disease had, therefore, evidently preceded the acute renal changes.

The arterioles are sometimes much thickened, whilst there is no kidney disease or very little morbid changes in the kidneys. In support of this statement we may first mention the case of John C—, æt. 34, who died of aneurism of the aorta. His kidneys were carefully examined, and they presented no signs of disease. The arterioles of the pia mater were much thickened by the formation of fibroid material external to the muscular nuclei. The kidneys were healthy and the arterioles thickened in the case of Sarah S—, æt. 63 (see Case 1); also in the case of Samuel C—, æt. 62 (see Case 19); also in the case of James D—, æt. 77 (see Case 8); also in Case 2.

In other cases there was little morbid change in the kidneys, no morbid change to indicate that their excretory power had been greatly diminished; whilst the heart was much hypertrophied and the vessels much thickened. This is shown in cases 7, 10, and 20.

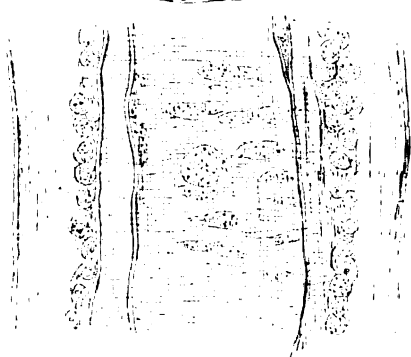
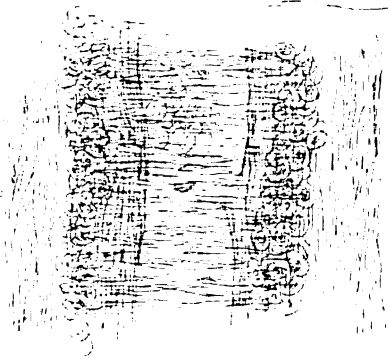
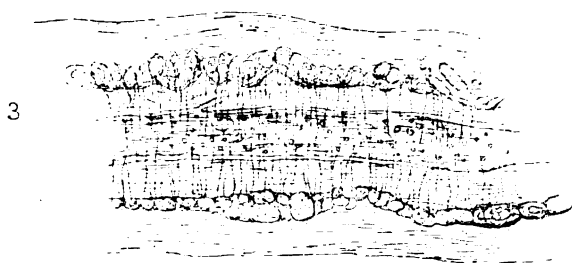
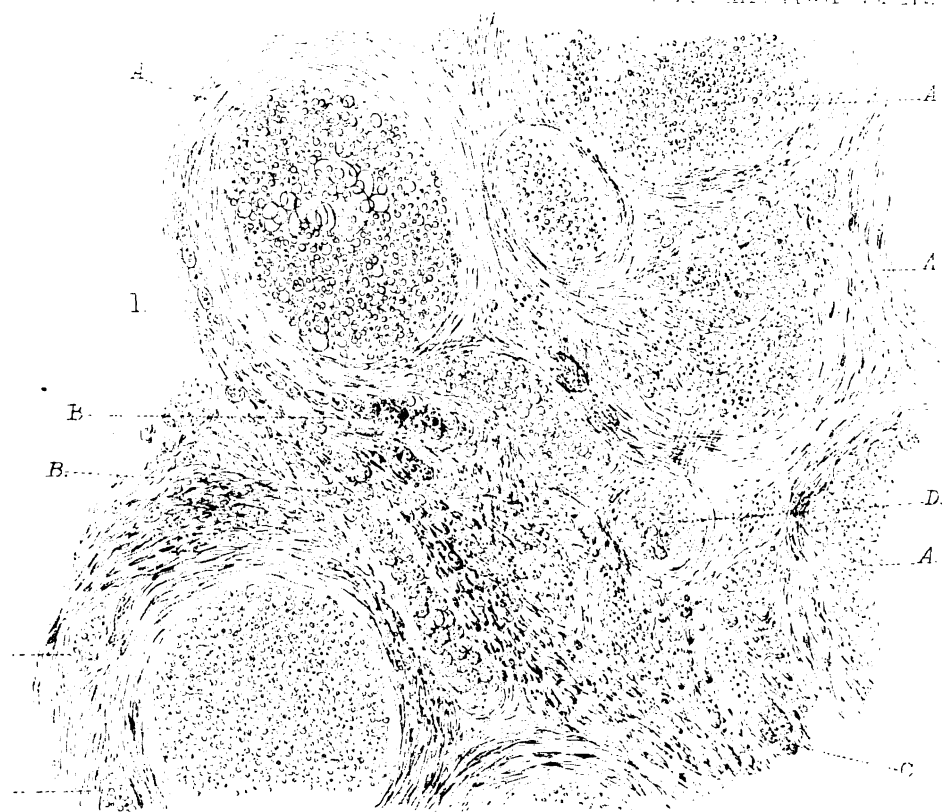


DESCRIPTION OF PLATE V.

- Fig. 1.** The microscopical appearances seen in very granular contracted kidneys. (From a girl aged nine years.)

The letter **A** points to six Malpighian bodies which are lying clustered together, and surrounded by a quantity of fibroid material. These bodies contain numbers of fat and other granules. A convoluted tubule indicated by **D** is seen coming down from one of the Malpighian bodies, with its epithelial cells destroyed. The letters **s** mark tubules which are lined with epithelial cells for the most part healthy. **c** points to isolated wasted tubules containing shrivelled, ill-defined, epithelial cells, and in some, in place of epithelium, nothing but fat-granules remain.

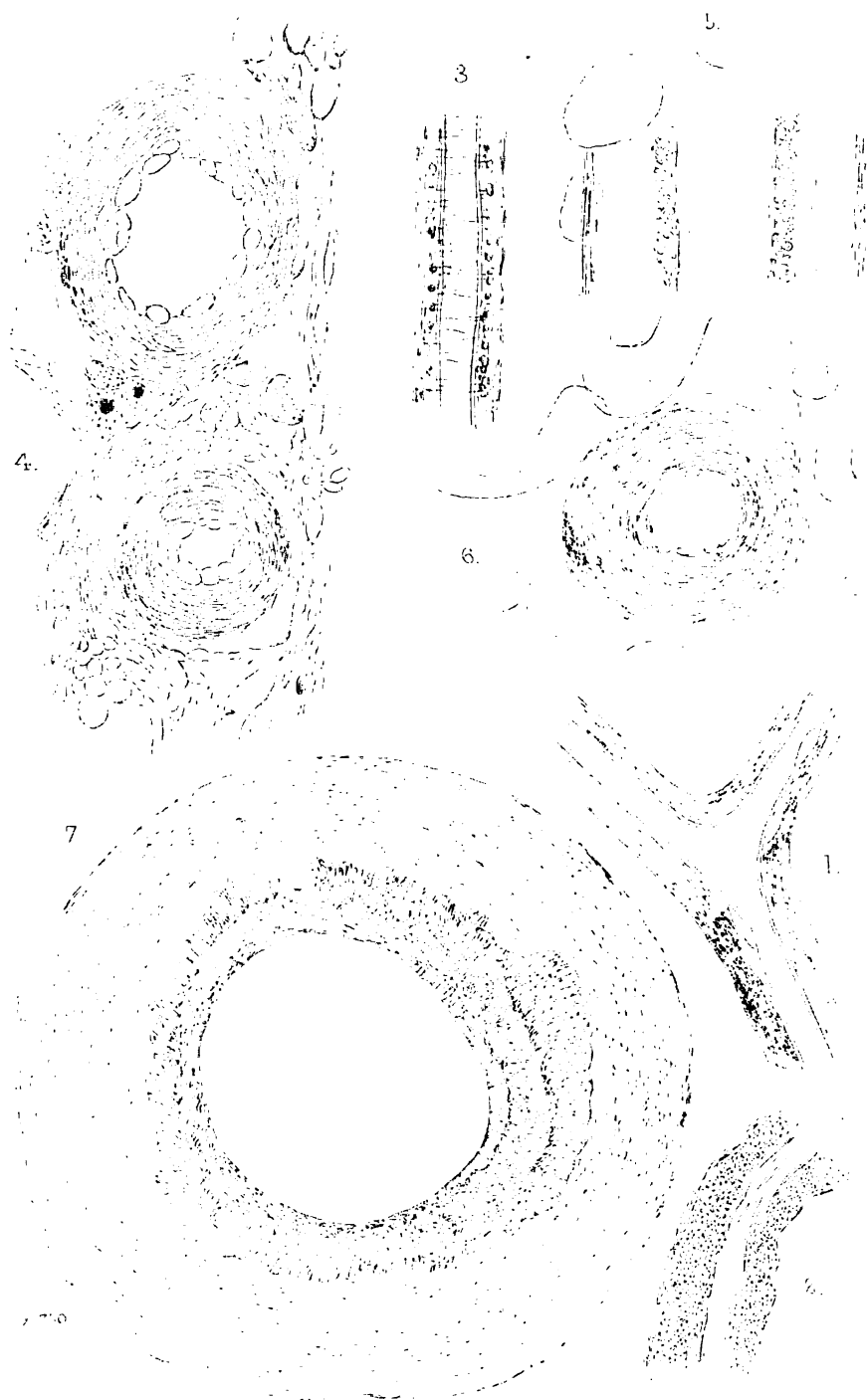
- Fig. 2.** Arteriole much thickened by coarse fibroid changes outside muscular layer; tunica intima thickened also.
- Fig. 3.** Tunica adventitia and intima thickened by fibroid changes.
- Fig. 4.** Arteriole of the pia mater. Fibroid changes outside the muscular nuclei.





DESCRIPTION OF PLATE VI.

- Fig. 1. A capillary of the pia mater much thickened by a homogeneous hyalin substance.
- Fig. 2. Capillary very much thickened by a granular substance.
- Fig. 3. Hyalin-fibroid thickening outside the wasted muscular layer.
- Fig. 4. The arterioles in the choroid greatly thickened by the formation of fibroid material outside the so-called muscular nuclei. The dark parts represent choroid pigment.
- Fig. 5. Arteriole of skin thickened by fibroid formation outside muscular layer.
- Fig. 6. Arteriole lying amongst muscular tissue of heart greatly thickened by the fibroid material.
- Fig. 7. Minute artery of the kidney greatly thickened by hyalin-fibroid changes in the outer layer of the vessels.





INDEX.

This Index is made on the same principles as, and is in continuation of, the General Index to the first fifty-three volumes of the 'Transactions,' and separate copies may be had by Fellows wishing to insert them in interleaved copies of the General Index.

ANÆSTHETICS, on ether and chloroform as (J. W. Haward) 5

American and other statistics as to the greater safety of ether, 6; fatality of chloroform from sudden failure of heart's action, 7-8; ether antagonistic to the shock of an operation, and less liable to produce after-sickness, 8-9; principles of ether administration, 10; appendix of fatal cases of chloroform inhalation, and of cases of ether inhalation, 13-16.

ANEURISM, ABDOMINAL, case of, cured by compression of the aorta (W. Moxon and A. E. Durham) . 213

Reference to one previous case, by Dr. Murray, of Newcastle, 214; treatment of case, 214-18; general conclusions from the two cases, 219-22.

— treated by distal pressure (T. Bryant) . 225

Treatment, unsuccessful, 226-7; post-mortem, by Dr. Moxon, 227; remarks on the danger attending instrumental pressure by tourniquet, and in favour of the adoption of pressure on the efferent artery, 228-30.

ANUS, ARTIFICIAL, in the small intestine, in a case of intestinal obstruction (J. McCarthy) . 267

AORTA, COMPRESSION of the, in a case of abdominal aneurism (W. Moxon and A. E. Durham) . 213

APHASIA, congenital, case of . 155

See *Speech*

ATROPHY, unilateral, of the tongue (W. Fairlie Clarke) 91

BASTIAN, H. Charlton

Essential points of his hypothesis on the physiology of thinking (referred to) . . . 180

BIERMEER, —

Classification of warm climates (referred to) . . . 250

BILIARY CONCRETIONS, see *Calculus* (biliary)**BOINET, —**

On suppuration in ovarian cysts (quoted) . . . 201

BRAIN, on the mechanism of speech and thought in (W. H. Broadbent) . . . 145**BRIGHT'S DISEASE, chronic, with contracted kidney (arterio-capillary fibrosis), on the pathology of the morbid state commonly so called (Sir W. Gull and H. G. Sutton)** 273

Consideration of the morbid changes in the kidneys, and question of their primary affection, 273-9; morbid changes in the epithelium, 276; opinions of Dr. G. Johnson and Dr. Dickinson, 276-82, 285, &c.; hyalin-fibroid formation, 278-83, &c.; other pathological changes in the arteries, 279, &c.; thickening of minute arteries, 279; experiments on the vessels of the pia mater, 280, &c.; hypertrophy of left ventricle, 286-90; vesicular emphysema, retinitis albuminurica, diminished spleen, &c., 290-92; exposure to granular degeneration of kidney at different periods of life, 292; conclusions as to the morbid state "hyalin-fibroid formation" in the arterioles and capillaries, 295; appendix of cases, 296-326; table of cases in which minute arteries and capillaries were healthy, but with fat-granules in the walls of the vessels, 319.

BROADBENT, William Henry, M.D.

On the cerebral mechanism of speech and thought . . . 145

BRYANT, Thomas

On the surgical indications in suppuration in ovarian cysts (referred to) . . . 204

BRYANT, Thomas

Case of abdominal aneurism treated by distal pressure, with remarks . . . 225

CALCULUS, BILIARY, case of a large biliary concretion in the ileum (Le Gros Clark) . . . 1**CALCULI, RENAL, of unusual shape found in the left kidney of a woman who died of cancer of the uterus (Jeremiah McCarthy)** . . . 263**CANCER, death from, in a case of intestinal obstruction (Jeremiah McCarthy)** . . . 267

of the uterus, death from, renal calculi of unusual shape found in the left kidney in a case of (Jeremiah McCarthy) . . . 263

- CARTILAGES** of the larynx, section of the, for the removal of morbid growths (A. E. Durham) . . . 17
- CHLOROFORM**, on, as an anæsthetic (J. W. Haward) . . . 5
- supplementary *table* of fatal cases of , , 13
- fatality of, from sudden failure of heart's action . . . 7-8
- CLAMP**, successful use of, in adherent ovarian cysts . . . 205
- CLARK, F. Le Gros**
 Case of large biliary concretion in the ileum . . . 1
- CLARKE, William Fairlie**
 On a case of unilateral atrophy of the tongue . . . 91
- CLIMATES**, warm, effects of, in the treatment of pulmonary consumption, as exemplified by an analysis of two hundred and fifty-one cases (C. T. Williams) . . . 233
- COMPRESSION** of the aorta in a case of abdominal aneurism (W. Moxon and A. E. Durham) . . . 213
- See *Pressure*
- CONSUMPTION, PULMONARY**, effects of warm climates in the treatment of, as exemplified by an analysis of two hundred and fifty-one cases (C. T. Williams) . . . 233
- Grounds on which a selection of climate is based, 233-36; want of practical records of ascertained effects of climates by local practitioners, 236; references to good results obtained in high altitudes from Weber, Walshe, Brehmer, &c., 237; specimen of mode of tabulation, 238; Table I, age at time of attack, 239; Table II, influence of warm climates on the lungs, 241; classification of climates into groups, 244-5; Table III, influence of warm climates (foreign) in consumption, 248; Biermer's classification of warm climates, 250; Table IV, relative condition of lung in patients wintering in various climates, 252; objections to Pau as a winter climate, 253; Rome and Madeira, 253-56; success of sea voyages, 257; influence of climate on different forms of consumption, 258; duration of life, 260.
- CYSTS**, see *Ovarian Cysts*
- DICKINSON, W. H., M.D.**, opinions relative to the changes in the epithelium of the convoluted tubules in chronic Bright's disease (referred to) . . . 276
- DUPUITREN, Baron**
 Case of unilateral atrophy of the tongue . . . 94

DURHAM, Arthur E.

On the operation of opening the larynx by section of the cartilages, &c., for the removal of morbid growths . . . 17

and *Walter MOXON, M.D.*

On a case of abdominal aneurism cured by compression of the aorta 213

ELBOW-JOINT, see *Shoulder* and elbow-joint

EMBOLISM, cases of right hemiplegia and loss of speech from . . . 158

EMPHYSEMA, VESICULAR, in chronic Bright's disease . . . 290

ENTERIC FEVER, on the relation between it and scarlet fever (John Harley) 103

ETHER, on, as an anæsthetic (J. W. Haward) 5

statistics as to the relative greater safety of 6

antagonistic to the shock of an operation, and not liable to produce after-sickness 8-9

principles of its administration 10

table of cases of inhalation of 14

EXCISION, see *Resection*

FEVER, on the relation between enteric and scarlet fevers (John Harley) 103

cases illustrating the transition from scarlet to enteric 126

cases of the concurrence or interoccurrence of scarlet and enteric 134

FIBROSIS, arterio-capillary, "Chronic Bright's disease with contracted kidney," pathology of (Sir Wm. Gull and H. G. Sutton) 273

GROWTHS, morbid, section of the cartilages of the larynx for the removal of (A. E. Durham) 17

GULL, *Sir William W., M.D.*, and *Henry G. SUTTON, M.B.*

On the pathology of the morbid state commonly called chronic Bright's disease, with contracted kidney (arterio-capillary fibrosis) 273

GUNSHOT, see *Wounds*

HARLEY, John, M.D.

The pathology of scarlatina and the relation between enteric and scarlet fevers 108

HAWARD, J. Warrington

On ether and chloroform as anæsthetics 5

HAWKINS, Caesar

On artificial anus in the small intestine (notice) 272

HEART, fatality of chloroform from sudden failure of the action of 7-8

fatty degeneration of, death from, in a case of intestinal obstruction (J. McCarthy) 267

formation of fibrinous clots in, in scarlatina 121

hypertrophy of the left ventricle of, in chronic Bright's disease 286-90

HEMIPLEGIA, right, with loss of speech, &c., cases of 146, &c.

HOLMES, Timothy

On the surgical treatment of suppurating ovarian cysts, and on pelvic adhesions in ovariectomy 195

HYALIN-FIBROID formation, see *Bright's disease*

HYPERTROPHY of the left ventricle in chronic Bright's disease 286-90

ILEUM, case of a large biliary concretion in the (Le Gros Clark) 1

INJURY, see *Wounds*

INTESTINES, OBSTRUCTION of, in which an artificial anus was made in the small intestine; recovery; subsequent death from cancer and fatty degeneration of the heart (Jeremiah McCarthy) 267

JOHNSON, George, M.D., opinions relative to changes in the epithelium, and the thickening of the coats of minute arteries in chronic Bright's disease, &c. (referred to) 276-85

KIDNEY, left, see *Calculi* found in

contracted, see *Bright's disease* (chronic)

granular degeneration of, exposure to at different periods of life 292

- LARYNX**, operation of opening, by section of the cartilages, for the removal of morbid growths (A. E. Durham) . . . 17
 Five cases at Guy's Hospital, 18-27; analysis of fatal cases, 30-4; modes of performing the operation, &c., 34-40; appendix of condensed reports of thirty-two other cases, 40-90.
- LIVER**, marked derangement of its function in scarlatina . . . 122
- LYMPHATIC** system, general inflammation of, in scarlatina . . . 123
- McOATHY, Jeremiah*
 Account of some renal calculi of unusual shape found in the left kidney of a woman who died of cancer of the uterus, &c. 263
 Case of intestinal obstruction, in which an artificial anus was made in the small intestine; recovery and subsequent death from cancer and fatty degeneration of the heart . . . 267
- MAC OORMAC, William*
 Case of resection of the shoulder and elbow-joints of the same arm for gunshot injury 207
- MACKENZIE, Morell**
 See *Durham*, on section of laryngeal cartilages for removal of morbid growths
- MOXON, Walter, M.D.**
 Post-mortem in case of abdominal aneurism 227
- MOXON, Walter, M.D., and Arthur E. DURHAM*
 On a case of abdominal aneurism cured by compression of the aorta 213
- MURRAY, William, M.D.**
 On the rapid cure of aneurism by pressure (referred to) . . . 214
- NECROSIS** of the body of a cervical vertebra, case of complete recovery after (Wm. Ogle) 139
- NERVE**, right hypoglossal, question of lesion of, in unilateral atrophy of the tongue (W. Fairlie Clarke) 98
- OGLE, William, M.D.*
 Case of complete recovery after necrosis of the body of a cervical vertebra 139
- OVARIAN CYSTS**, suppurating, on the surgical treatment of, and on pelvic adhesions in ovariectomy (T. Holmes) . . . 195
 Case, 195-200; ovariectomy, 198; remarks on chronic suppuration in ovarian cysts, 200; quotations from Boinet, Sir J. Simpson, and Spencer Wells, 201-3; diagnosis from acute tenderness with low peritonitis, emaciation, and feeble pulse, 203; T. Bryant's and Spencer Wells' opinions as to the surgical indications, 204; successful use of the clamp in adherent cysts, 205.

- OVARIOTOMY**, on pelvic adhesions in (T. Holmes) . 195
- PAGET**, Sir James
Case of unilateral atrophy of the tongue . . 96
- PELVIC ADHESIONS** in ovariectomy (T. Holmes) . 195
- PHTHISIS**, pulmonary, effects of warm climates in the treatment of, as exemplified by an analysis of two hundred and fifty-one cases (C. T. Williams) . 233
- PRESSURE**, distal, in a case of abdominal aneurism (T. Bryant) 225
- See *Compression*
- RESECTION** of the shoulder and elbow-joints of the same arm for gunshot injury (Wm. Mac Cormac) . 207
- RETINITIS** albuminurica in chronic Bright's disease . 291
- SCARLATINA**, its pathology, and the relation between enteric and scarlet fevers (John Harley) . 103
- Cases 1 to 28, illustrating the morbid changes observed in scarlatina, 104-20; analysis of ditto: formation of fibrinous clots in the heart and great vessels, marked derangement of hepatic function, and general inflammation of the lymphatic system, 121-25; identity of the pathological changes in scarlatina and the first stage of enteric fever, 125-26; cases illustrating the transition from the former disease to the latter, 126-33; cases of the concurrence or intercurrent of scarlet and enteric fevers, 134-38.
- SCARLET FEVER**, on the relation between it, and enteric fever (John Harley) . 103
- SHOULDER** and **ELBOW-JOINTS**, resection of, in the same arm for gunshot injury (Wm. Mac Cormac) . 207
- SIMPSON**, Sir James
On suppuration in ovarian cysts (quoted) . 201
- SPEECH** and **THOUGHT**, on the cerebral mechanism of (W. H. Broadbent) . 145

Question of the association of loss of speech with lesion of a convolution in the left hemisphere of the brain, based on the close functional relation between the left third frontal gyrus and speech; the object of the paper: to construct a theory of the mechanism of speech and thought by means of the light thrown on cerebral physiology by cases of loss or derangement of speech, &c.

Ten cases illustrating the close functional relation of the expression of thought by language with the posterior end of the third

frontal convolution of the left hemisphere, 146-72; the two classes of cases—amnesic and aphasic, 174; the essential points of Dr. Bastian's hypothesis adopted by the author, 180; statement of the author's hypothesis and his modifications of that of Dr. Bastian, 181-193; summary of the theory of the mechanism of speech, 193-94.

SPLEEN, diminished, in chronic Bright's disease . 291

SUTTON, H. G., M.B.

On chronic Bright's disease, see *Gull* and *Sutton*

THOUGHT, see *Speech*

TONGUE, case of unilateral atrophy of (W. Fairlie Clarke) 91

Other cases: Baron Dupuytren's in the 'Leçons Orales,' 94; Sir James Paget's in the 'Clinical Society's Trans.,' vol. iii, 96; question of the involvement of the right hypoglossal nerve in a cancerous tumour, 98; notice of other cases, 101.

TRACHEOTOMY, cases of, for removal of morbid growths (A. E. Durham) 40

See *Larynx*

UTERUS, see *Cancer of*

VERTEBRA, cervical, case of complete recovery after necrosis of the body of a (Wm. Ogle) 139

WELLS, Spencer

On suppurating cysts (quoted) 202

On operating in cases of suppurating ovarian cysts (referred to) 204

WILLIAMS, Charles Theodore, M.D.

On the effects of warm climates in the treatment of pulmonary consumption, as exemplified by an analysis of two hundred and fifty-one cases 233

WOUND, GUNSHOT, resection of shoulder and elbow-joints in the same arm for (Wm. Mac Cormac) 207







JUN
13

